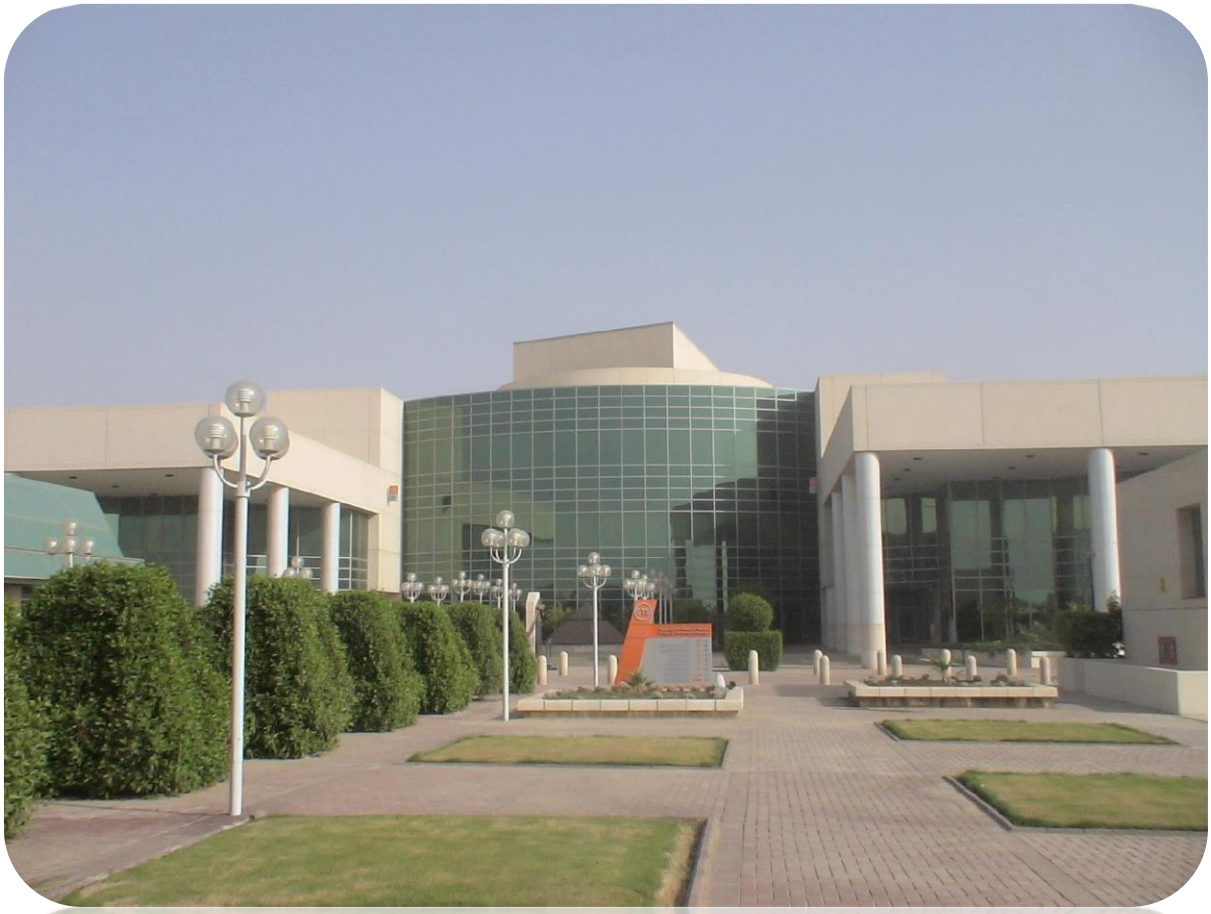
The Public Authority for Applied Education and Training
College of Technological Studies

College Catalogue 2019/2020



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College History and Overview

The Industrial College was the first educational institution to design and offer curricula related to the technological field. It started in the academic year 1954–1955 at the level of secondary stage. In 1976–1977, the study program in the Industrial College was terminated and its title is changed to 'Kuwait Institute for Applied Technology' (1976), 'Kuwait Institute for Technology' (1983) and finally 'College of Technological Studies' (1986), which admitted secondary school leavers or equivalents. The duration of the study program was five semesters after which the graduate obtains a diploma in his specialization. The College of Technological Studies (CTS), in its early and present forms, has witnessed continuous development processes because of the country's policy of adopting up–to–date technologies. This development was included in programs, plans, curricula, tuition systems, constructions, laboratories, workshops, etc. to keep abreast of the latest technology used in the labor market. CTS is, therefore, one of the Public Authority for Applied Education and Training (PAAET) colleges that is closest to the needs of the development plans and the fastest to meet the escalating needs of the labor market.

Mission Statement

The College of Technological Studies offers support to national programs of social and economic development through technological education and professional programs directed towards the specific needs of workforce market.

Vision Statement

The College of Technological Studies aims towards educating and training highly qualified professionals to join the national workforce required by industrial, governmental, and private sector in many technology streams to meet the following objective:

1. Offering a globally accredited programs in nationally required engineering technology programs.
2. Continuous development of programs to convoy with advancement in technology.
3. Leading technological education in Kuwait.
4. Achieving partnership with industrial and educational sectors in the development of national economy.

The diploma degree holders graduating from this college are qualified for jobs in the labor market as assistant engineers and technicians. The college is keen on maintaining the following student outcomes:

I. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well–defined engineering problems appropriate to the discipline.

II. an ability to design solutions for well–defined technical problems and assist with the engineering design of systems, components, or processes appropriate to the discipline.
III. an ability to apply written, oral, and graphical communication in well–defined technical and non–technical environments; and an ability to identify and use appropriate technical literature.
IV. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results; and
V. an ability to function effectively as a member of a technical team.

The baccalaureate of engineering degree holders graduating from this college are qualified for jobs in the labor market as engineers. The college is keen on maintaining the following student outcomes:

I. an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems appropriate to the discipline.
II. an ability to design systems, components, or processes meeting specified needs for broadly defined engineering problems appropriate to the discipline.
III. an ability to apply written, oral, and graphical communication in broadly defined technical and non–technical environments; and an ability to identify and use appropriate technical literature.
IV. an ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and
V. an ability to function effectively as a member as well as a leader on technical teams.

Students Services

Following is an outline of human development–related units:

Dean of Admissions and Registration's Office

The office is an important link between PAAET and its colleges on the one hand, and students with their needs and aspirations on the other.

The office is in charge of implementing admission, registration policies and procedures with regard to warnings, honors lists, issuing various documents and certificates, following up major sheets, establishing graduation procedures and filing graduates' data. The office's organizational structure consists of the following:

1. Assistant Dean – Admissions

   Responsible for suggesting and implementing set admission policies, laying down admission requirements, rules and numbers and advertising the same in the media, preparing and publishing admission handbooks, preparing aptitude tests, and providing admission forms.

2. Assistant Dean – Advising

   Gives advice and guidance to students on the appropriate type of education or training that best suits their aptitudes and abilities.

3. Registrar – General

   Suggests registration rules and regulations for PAAET colleges and academic departments and lays down systems and procedures for tracking students' progress in accordance with the Regulations of Study at PAAET colleges.

In–Service Training Center

The Center offers job–related training to workers by providing them with knowledge and by helping them to acquire the necessary skills and abilities or develop their present ones with the aim to enhance their level of performance and boost their productivity. Training is given by specialists either from among faculty members or trainers or practitioners of relevant fields. Technical courses are given at PAAET colleges and institutes. In–service training programs are divided into two categories:

1. Annual–plan programs: ready–made programs offered to the public, joint and private sectors.
2. Customized (tailor–made) programs: offered to organizations according to the level of their employees who are receiving training and the objectives of the course.

In–service training programs include programs for top management as well as training, computer and technical and vocational fields.

Learning Resources Department

The Department supervises the work of the libraries and educational technology units at PAAET colleges and institutes to develop them to serve the purpose of education and research.

I. Libraries

1. Number: 17
2. Number books held: 130,000 volumes
3. All library services (lending, reference, etc.) are computerized in addition to Internet search.

II. Educational Technology Units

1. Number: 5
2. Supplies classrooms with teaching aids and equipment.
3. Helps faculty members produce transparencies and other audio–visual aids.
4. Shares in documenting and photocopying the respective college's or institute's activities.

III. Indexing and Classification Section

1. Indexing and classification of all channels of information in various forms (books, journals and other audio–visual aids).
2. Completion, updating and maintenance of a bibliographic database of all Department's acquisitions to bring about a paradigm shift in research.

IV. Acquisition Section

1. Follows up the latest developments in channels of information (books, journals, audio–visual aids and equipment), which serve the purposes of the teaching
2. Learning processes and supplying libraries and educational technology units with necessary resources.
3. Selection and orders are made in coordination with academic departments.
4. All section's procedures are computerized using the HORIZON integrated information system.

V. Liberant

1. A sophisticated electronic center for research resources and scientific database for faculty members and researchers.
2. Its objectives include the following:

    a. Providing readily available sources of information to as many faculty members as possible
    b. Using other databases and resources available at comparable institutions.
    c. Creating a multimedia production unit for media titles.
    d. Producing programs on CDs using multimedia applications for various sectors of PAAET.
    e. Establishing a digital library and electronic archive for the storage of PAAET's collection of pictures, video cassettes and other audio materials on CDs so that it is readily available for all sectors of PAAET.
    f. Designing and producing interactive multimedia educational programs for certain specializations in association with the concerned parties.

Scholarships & Educational Relations Department

Duties and responsibilities include:

1. Implementing the recommendations of the General Scholarships Committee.
2. Identifying needs of PAAET in terms of scholarships and study leaves.
3. Monitoring the progress of PAAET's students on scholarships and solving the problems facing them.
4. Participating with the concerned authorities with regard to the drafting of cultural and academic agreements with Arab and non–Arab counterparts and monitoring their implementation.
5. Taking advantage of the bilateral cultural agreements signed between the State of Kuwait and other countries.
6. Coordinating with the concerned authorities regarding the exchange of visits of official delegations related to cultural and academic affairs.
7. Suggesting amendments to the systems and regulations of scholarships and sabbaticals.

The Department comprises the sections of

- Cultural Relations
- Scholarships
- Follow-up

Academic Programs System

Course

A plan of study on a particular subject with theoretical or practical content during one semester, carrying a given number of credits under the system of study.

Credits

Weekly and annual credits are given weightings in the following manner:

a. Course credit: 1 contact hour for theoretical courses, or 2–3 hours for practical courses.
b. Field Training credit: 3 to 4 hours per credit.

The designated Academic Affairs Committee of the college decides the number of hours of the practical and field training courses.

Study Program (Curricula)

A set of courses and activities in a particular specialization undertaken by students during a specific period in order to qualify for graduation.

Plan of Study

The way in which the program is implemented over the given semesters. It includes subscribed courses, the successful completion of which leads to the award of a degree.

Implementation of the program shall take into consideration the sequence in which courses must be offered, prerequisites and resources available in the colleges.

Classification of Courses

Courses shall be classified as follows:

I. The nature of the course:

a. Theoretical: Academic content dealing with the basic principles and concepts of a particular field of knowledge.

b. Practical: A set of experiments, applications and exercises intended to develop the skills and abilities of students.
c. Field Training: Field experience at one of the job markets and is designed to develop students' skills and enhance their achievement.

Courses may be mixed.

II. According to type:

a. General Studies (General Education Courses):
Courses are designed to raise the standard of good citizenship by giving importance to all aspects: cultural, spiritual, social, health and sports, as well as providing a foundation on other subjects of knowledge that serve the purpose of PAAET's philosophy.
b. Specialist or professional courses:
Course aim to provide knowledge and expertise in the chosen field of study and have a distinct, inter–related nature in theoretical, applied or practical body of knowledge.
c. Minors:
Courses increase knowledge or experience that support the major courses and help students acquire the required knowledge to complete their professional training and area of specialization.
d. Electives:
Courses offered by PAAET, be it arts and music or general education courses or courses from the same major or otherwise. Electives may be any of the offered courses with the exception of the following:
e. All general education courses.
f. Minors offered to other majors.

Prerequisite

A course that must be successfully completed prior to registering for an advanced course.

Concurrent Courses

Those in which two courses are done concurrently (at the same time).

Remedial Courses

These are designed to provide students with a body of knowledge to enhance their academic level in certain areas of study and qualify them to enroll in credit courses. Remedial courses are non–credit courses.

The College's Academic Affairs Committee, upon the recommendation of the concerned academic department, shall be authorized to define the prerequisites of the concurrent or remedial courses.

Course Coding

1. Courses shall be coded in the following manner:
   a. 101–199: First–Year level
   b. 201–299: Second–year level
   c. 300–399: Third–year level

2. Each course number is preceded by the code of the respective department.
3. Colleges may organize special courses for certain students to complement their knowledge or raise their academic level in certain subjects. These do not carry any credits and are given codes 011 to 099.

Admissions

Admission requirements

Male and female students shall be enrolled in PAAET colleges on the basis of the following general requirements:

- Admission priority is given to Kuwaiti nationals.
- Nationals of the Gulf Cooperation Council, students on scholarships from Arab and foreign countries and children of residents are enrolled at a rate not exceeding 15% of the total enrolments in accordance with the relevant rules and regulations of PAAET.
- Applicants must be secondary school leavers or holders of an equivalent certificate obtained in the previous two years, which is appropriate to the nature of study in the major applied for.

Applicants must fill in application forms during the specified period with the following documents enclosed:

1. The school–learning certificate authenticated by the proper authorities.
2. The civil identity card (ID) and a copy thereof.
3. Declaration of intention to study on a full–time basis.
4. Any other documents required by PAAET.

Re–enrolment

A student may not re–enroll in any PAAET colleges in any of the following events:

1. If he was expelled due to scoring a lower GPA or major average than the required level.
2. If he was expelled for being caught cheating twice in exams.
3. If he was expelled for disciplinary action.
4. If he failed to complete his study successfully within the maximum time limit.
5. If he has withdrawn his documents.
6. If he was expelled for non–attendance.

Change of Major in the College

A student may change his major on the basis of the following rules and regulations:

1. Change of major shall not be permissible during his/her first semester in college.
2. The number of credits obtained shall not exceed 45 in four–year programs and 30 for other colleges.
3. Joint (core) approved credits upon change of major shall not be counted as obtained credits.
4. Change of major shall be allowed only once during a student's duration of study in college.
5. Following a change of major and for the purpose of calculating a student's GPA, his/her transcript shall remain unchanged and all completed courses will be counted.
6. Students shall be exempted from re–doing previously completed courses approved by the concerned academic departments and forming a component of the new major.

7. Colleges' Academic Affairs Committees shall establish the major changes in rules and regulations in accordance with the approved admission policy and in the light of labor market requirements and vacancies in the desired major.

Transfer to PAAET Colleges and Inter–College Transfers

1. A student may change from one college to another within PAAET from an accredited counterpart based on the available resources and annual admission policy. Transfer applications shall be submitted to Dean of Student and the office of Trainee Affairs and shall be subject to the following requirements:
   a. Consent of the PAAET college, in which the student is enrolled, for the transfer application shall be obtained.
   b. The student shall satisfy the admission requirements of the college he/she is being transferred to.
   c. The student shall not be suspended as a disciplinary measure.
   d. On submission of the transfer application, the student should have completed at least one semester at a college or institute.
   e. For inter–college transfers, the number of credits already obtained shall not exceed 45 for four–year programs and 30 for other colleges.
   f. The student shall not have previously withdrawn his documents from any of PAAET colleges.
   g. The student shall not have been expelled from any PAAET college due to non–attendance.
2. In the case of inter–college transfers, a student's transcript shall remain unchanged and all courses previously taken in the college transferred from shall count for the purpose of calculating his GPA.
3. Students shall be exempted from re–taking previously completed courses approved by the concerned academic departments if the student is transferring from a PAAET college.
4. Approved credits shall not count for the purpose of calculating the grades of students transferred from a non–PAAET college, and they shall be deemed to have obtained the number of credits equivalent to a maximum of 50% of the credits required for graduation in the college he/ she is being transferred to.
5. Academic departments shall specify the courses which a student may be exampled from and which are equivalent to the courses previously completed successfully with at least a C (Good) grade at a non–PAAET college or institute.
6. Once a student is exempted from a course(s) because of the transfer after the withdrawal period, his registration for such courses shall be cancelled.
7. The duration of study of the approved courses at non–PAAET colleges or institutes shall count as part of the maximum time limit for graduation based on normal load per semester.

Auditing (Non–degree courses)

1. The College Dean may allow the following interested parties to register for some of the offered courses as auditors within the limits of the college facilities and capacity:
   a. College employees, according to the nature of their jobs subject to consent of supervisor and approval of the Dean, provided this does not interrupt the performance of their duties.

b. Kuwaitis and those treated similarly holding a General secondary School Certificate.

2. Registration shall take place during the late registration period. The College Dean may at his discretion accept excuses for registration after expiry of such period and by the end of the second week of classes.
3. Auditors shall not be allowed to sit end–of–term exams in the enrolled courses.
4. Auditors shall pay the prescribed course fees.

Credits Transfer

Kuwaiti students enrolled in foreign universities recognized by the Kuwait Ministry of Higher Education may register for a maximum of seven credits in one or more semesters for the duration of his studies.

Students enrolled in PAAET colleges may enroll in a non–PAAET college and register for up to seven credits in one or more semesters for the duration of his studies. Such courses shall count as graduation requirements subject to the following regulations:

1. The applicant's obtaining the prior consent of the relevant academic department of PAAET.
2. The university or college being recognized by the Kuwait Ministry of Higher Education.
3. The course content being equivalent to a course constituting a part of the student's graduation requirements.
4. The student's completing the course with at least a C (Good) grade.

The Grading Policy

The Evaluation System

The student's performance and effort shall be evaluated on an on–going assessment basis for the duration of the semester in addition to an end–of–term exam.

The total score shall be distributed as follows:

1. Fifty percent for on–going assessment of term work.
2. Fifty percent for end–of–term exams.

Academic departments, subject to approval of the College's Academic Affairs Committee, may change the above distribution to suit the nature of the courses.

Prior to each semester, faculty members shall distribute the work plan approved by the respective department to the students, which contains the following:

a. Course objectives.
b. Course content and weekly distribution
c. Evaluation scheme
d. Tests and quizzes during the semester
e. Textbooks and references
f. Office hours

Duration of End–of–Term Exams

The time allowed for end–of–term exams shall be two hours. The College's Academic Affairs Committee may amend this Article in special cases and on the recommendation of the concerned academic department.

Deferment of End–of–Term Exams

1. A student shall be deemed to have failed the final exam if absent from it.
2. Final exams may be deferred in exceptional cases under the following conditions:
    a. The student under consideration was absent from the final exam for a reason beyond his control.
    b. The student or his authorized representative shall submit an application for exam deferment to the head of department or his deputy within three days of the exam date enclosing the necessary testimonials therewith.
    c. There shall be mutual agreement between the course instructor, the concerned head of the department or his deputy and the college dean for each course.
3. The course instructor shall send a score sheet to the Registration Office putting a note of I (Incomplete) opposite the name of the student under consideration without giving him a grade.
4. After the student attends the exam, the course instructor shall inform the result to the Registration Office within the following time periods:
    a. Within a week of the start of classes in the autumn semester for both previous spring and summer courses.

b. Within a week of the start of classes in the spring semester for the previous autumn semester courses.

5. If the student fails to attend the exam on the above–mentioned dates, he shall receive an FA (Fail) grade.

The Credit Course System

PAAET colleges shall follow the credit course system, under which a given number of credits must be successfully completed by students in the level specified under these regulations to qualify for graduation. The credits are distributed over certain fields of study in accordance with these regulations.

Following consultation with their advisors, students may select the courses that they wish to enroll in from the offered courses according to their needs and aptitudes as well as graduation requirements and within the allowed student load.

Definition of Some Terms Used During the Academic Year

The academic year shall be divided into two semesters, each with a duration of 14 weeks in addition to two periods for advising and registration and end–of–term examinations.

The summer semester shall be optional and shall run for seven weeks, apart from a period for advising and registration and final examinations.

Grades and Points

Assessment of students' performance at the end of each semester shall be based on the points scored and final grade earned according to the following levels:

i. A student shall be deemed to have completed a course if he earns at least a D (Pass) grade.
ii. The course instructor shall announce the final exam result within three days of the date thereof.
iii. In the event that a student is not satisfied with his final grade in the end–of–term exam, he shall discuss the matter with the course instructor within two days of the date of the result, and if he is still not convinced of the instructor's clarifications, he shall lodge a complaint in writing with the college Dean within a week of the date of the result, and the Dean shall refer the complaint to the concerned head of the department to consider the same in accordance with relevant regulations laid down by the college's Academic Affairs Committee. Settlement of all grievances shall be made, and the Registration Office shall be informed thereof not later than the end of the late registration period of the subsequent semester.
iv. The course instructor shall in person deliver the grades of the students enrolled in the course to the Registration Office within two days of announcement of the result and not later than five days after the final exam date.
v. For the purpose of calculating a student's GPA and average grade, all courses registered for shall be counted and he shall re–take the courses he failed or take alternative courses, subject to regulations, and successfully complete them at the required level. He may not re–take a course he has previously passed with a C (Good) or higher grade. To calculate averages, only the second grades for the first eight and four re–taken courses shall be counted in four–year and two–year programs, respectively; for College of Technological Studies and General Nursing

Major at College of Health Sciences, the second grades for five re–taken courses shall be counted. In the event of extra courses, all these shall be considered.

vi. A student shall enroll on the same course if it is a required one or on any other course if it is an elective.

vii. A student may re–take one or more courses he has previously passed with a D (Pass) grade.

The following table shows the grading assessment guide:

Marks	Letter Grade		Grade Points
95–100	A	Excellent	4.00
90–94	A–	Excellent (low)	3.67
86–89	B+	Very good (high)	3.33
83–85	B	Very good	3.00
80–82	B–	Very good (low)	2.67
75–79	C+	Good (high)	2.33
70–74	C	Good	2.00
66–69	C–	Good (low)	1.67
63–65	D+	Satisfactory (high)	1.33
60–62	D	Satisfactory	1.00
< 60	F	Failed	0.00
Final Exam Absent	FA	Failed	0.00
Failed by disciplinary measure	XF	Failed	0.00
Course withdrawal	W		
Term withdrawal	Z		

Averages

Averages are the result of multiplying the number of points in each course by the number of credits assigned for such course. The following averages are calculated by rounding off to the nearest two decimals.

a. Semester Average: The quotient resulting from the division of the total number of points received during the semester by the number of credits allotted to these courses.
b. GPA: The result obtained by dividing the total number of points the student has obtained in all courses since he enrolled in the college by the number of credits allotted to these courses.
c. Major average: The result of the division of the total number of points the student has received in all specialist courses since he enrolled in the college by the number of credits allotted to these courses. Calculation of the major average starts upon the completion of two semesters in the college.
d.

Average Warning

If a student's GPA or major average at the end of any semester is below 2.00, his name shall be listed in the warning list during the subsequent semester, and this shall be recorded on his transcript.

If the student fails to raise his average to the required level during the next two semesters, he shall be expelled from the college.

The Student Affairs Committee shall be authorized to settle grievances from expelled students and allow them to re–enroll as an exception made for one semester only in accordance with these regulations and orders made for implementation thereof. The student shall be deemed expelled from the college if his semester grade is zero at the end of his first semester in the college.

Honors' List

The name of a student shall be listed in the honors' list during a semester if he has successfully completed the courses of the preceding semester under the following conditions:

a. The number of credits registered for shall not be less than the normal student load.
b. His semester average shall not be less than 3.50.
c. He shall not have previously faced any disciplinary action.

Advising and Registration

Graduation Requirements

A student shall graduate from the college if he satisfies the following requirements:

1. Successfully completing all courses required for graduation.
2. Earning at least a 2.00 GPA or major average.

The Dean of Student and Trainee Affairs' Office shall prepare a list of the students who satisfy all graduation requirements in accordance with these regulations and orders issued for implementation thereof, and the office shall submit the same to the Director General for approval by the Board of Directors of PAAET.

The student who meets all graduation requirements shall be awarded a certificate stating his major, date of graduation and GPA in accordance with these regulations and orders made for implementation thereof. The certificate shall be signed by the college Dean and the Director General and approved by Chairman of the Board of Directors according to the list of qualified graduates.

GPAs upon graduation shall be as follows:

Excellent : 3.60–4.00
Very Good : 2.80–3.60
Good : 2.00–280

Honors' Degree

The student who successfully completes his studies during the normal period thereof with a GPA of at least 3.75 shall be awarded an honors' degree provided he has not previously faced any disciplinary action.

Degrees and Diplomas Awarded

PAAET shall award the following diplomas and degrees:

1. A Diploma in Applied Sciences according to the majors offered by PAAET colleges as provided hereunder following a normal period of study ranging from at least four to five semesters for holders of Secondary School Certificate or an equivalent certificate.
2. A Baccalaureate in Applied Sciences according to the majors offered by PAAET colleges as provided hereunder following a normal period of study ranging from at least eight semesters for holders of Secondary School Certificate or an equivalent certificate.

Advising

PAAET colleges shall adopt the advising system under which each student has an advisor, preferably a faculty member. The advisor shall advise students with regard to the selection of courses to be taken and assist them in solving the problems that they may face. He also approves registration, addition and withdrawal forms.

Registration

Registration for courses shall take place during the week preceding the start of classes.

A system for early advising and registration may be applied in the second part of each semester for the following semester, under which courses are selected according to the needs of the students and the schedule of the college.

Late registration

Subject to consent of advisor and approval of office student and Dean of Trainee Affairs, students may register for courses on the first three days of classes every semester.

Regulations of registration for summer semester courses shall be the same as those for other courses. Students may not register for any course unless they have successfully completed its prerequisite (if prerequisite is required).

Students shall pay registration fees as specified by the Director General; students on scholarships shall be exempted from payment.

Study Load

Credits for which students may register in a single semester shall be determined as follows:

a. The normal load shall be the number of credits a student may register for in every semester. This is obtained by dividing the number of units as a graduation requirement by the number of normal semesters under those regulations (18 Credit hours).
b. The minimum load shall be three credits less than the normal load (15 Credit hours). The maximum load shall be three credits more than the normal load (21 Credit hours).
c. A student may register for a number of credits below the minimum load in exceptional cases and in accordance with the rules laid down by the college's academic affairs committee, subject to the consent of Advisor and approval of Dean.
d. A student may register for a number of credits above the maximum load if his/her graduation hinges on that, provided he/she registers for only one course carrying a maximum of the three credits (24 Credit hours).
e. Students on a warning list may not register for courses carrying more than one credit above the minimum load (16 Credit hours), with an exception of senior students who are expected to graduate at the end of the same semester, in which case they may register for courses carrying not more than two credits above the minimum load (17 Credit hours).
f. Students may register for a maximum of seven credits in the summer semester, with the exception of senior students who are expected to graduate at the end of the summer semester or the subsequent semester, in which case they may register for up to 9 credits.

Additions

Following approval of the Advisor and subject to the maximum load rules, a student may add a course(s) within the first week of the start of classes in the autumn or spring semester or in the first three days of the summer course.

Withdrawals

Following approval of the Advisor and subject to the minimum load rules, a student may drop a course(s) within the first seven weeks of the start of classes.

Likewise, subject to approval of the Student Affairs Committee, a student may drop the whole course for a semester. A note of Z is recorded on his transcript for one term without affecting the GPAs.

Attendance and Absence

1. Students shall attend classes regularly and punctually during the semester and field training.
2. In the event of absence from a course equivalent to a week's contact hours, a student shall be given a written warning notice by the course instructor; a second warning notice is given in the event of absence for two weeks.
3. In the event of absence for three weeks or more, the course instructor shall forthwith inform the Registration Office of barring the student under consideration from attending the end–of–term exams for that course.
4. The Registration Office shall give the student, the Advisor and the course instructor a copy of the barring decision. The student shall then be deemed to have failed the course and a note of F (Fail) shall be recorded on the transcript.
5. Subject to approval of the Director General, the allowed period of absence shall be extended for up to four weeks in the case of a student being called up as a reservist or appointed to represent the country abroad.
6. Regarding the summer semester, the first warning notice shall be given in the event of absence for 10% of the contact hours and the second warning notice in the event of absence for 15% of the contact hours. If absence exceeds 20% of the contact hours, the student under consideration shall be deemed to have failed the course and shall be barred from attending the final exam.

Determination of the Student's Year of Study

The student's year of study shall be determined on the basis of the number of credits obtained, as shown in the following table:

Credits obtained	Year
Up to 34	First
35–68	Second
69 +	Third

Time Limit for Graduation

The maximum time allocated for graduation is seven semesters for diploma and thirteen for baccalaureate.

Deferment of enrolment or non–attendance periods shall be included in the maximum allocated graduation time, except for those semesters in which a student is called for compulsory military service or maternity leave for a female student or if a male or female student accompanies their spouse on a scholarship abroad, in which case the maximum duration of studies shall be extended by up to two

semesters. If a student is accompanying a person receiving treatment or is on an official assignment, the extension may not exceed one semester.

In exceptional cases and in accordance with Student Affairs Committee's rules, a student may be allowed to continue at the college for one extra semester more than the maximum periods shown above.

Things to Know

Deferment

This refers to non–registration for courses for a prior valid excuse accepted by the Student Affairs Committee.

Dropouts

A student shall be deemed a dropout if he fails to register for courses for one or more semesters.

1. A student may not discontinue studies during the first semester he is enrolled in, except if he is in compulsory military service or any good reason accepted by the Student Affairs Committee.
2. A student who fails to attend classes for two weeks, consecutively or otherwise, shall be expelled from the college unless he/she gives reasons accepted by the Student Affairs Committee, in which case he/she shall be allowed to continue his/her studies according to his/her transcript.
3. A student shall be deemed to have failed all courses registered for in the semester he withdraws his documents from the college.

Events of dismissal from the college

A student shall be expelled from the college by order of the Director General in the following events:

1. If he fails to attend classes regularly during his first semester, notwithstanding the provisions of Article 38 hereof.
2. If he fails to attend classes for two semesters consecutively or otherwise, without prejudice to the provisions of Article 35 hereof.
3. If he fails to complete his studies successfully within the specified time limit, notwithstanding the provisions of Article 35 hereof.
4. If he is expelled from the college as a disciplinary measure.
5. If he is caught cheating for the second time in an examination.
6. If he fails to raise his GPA or major average to the required level for two semesters following a warning.
7. If he earns a zero GPA at the end of his first semester in college.
8. If he earns a semester average of less than one point in each of his first two semesters in college.

Cheating in Exams

1. In the event that a student is caught cheating or attempting to cheat, the course instructor or final exam invigilator shall substantiate this in a report stating the name of the student in question, his ID number, exam subject, time and date as well as an account of the incident and shall refer the same to the Dean.

2. The Dean shall take the necessary actions as follows:
   a. The Student shall be deemed to have failed the course in question, a grade of XF would show on his/her transcript.

   b. The student shall be barred from enrolment in the subsequent semester in addition to the summer semester.
   c. In case cheating takes place in the summer semester, the student's registration for such semester's courses shall be cancelled.
   d. A copy of the related decisions shall be sent to the course instructor concerned and the Registration Office.
3. If the same student is caught cheating again in the same or another semester, he shall be expelled from the college and the details of expulsion shall be recorded on his transcript.
4. The above provisions shall apply to any student caught cheating, attempting to cheat or assisting others to cheat.

Academic Departments and Majors

The College of Technological Studies is the home of nine different departments:

1. Department of Automotive and Marine Engineering Technology.
2. Department of Chemical Engineering Technology.
3. Department of Civil Engineering Technology.
4. Department of Electrical Engineering Technology.
5. Department of Electronic Engineering Technology.
6. Department of Laboratory Technology.
7. Department of Manufacturing Technology.
8. Department of Mechanical Power and Refrigeration Technology.
9. Department of Petroleum Engineering Technology.

The nine academic departments in the College of Technological Studies offer 21 educational programs leading to the Diploma in Applied Technology degree (Associate Degree) and one Baccalaureate in Engineering Technology. These programs provide diverse career opportunities.

All educational programs aim at qualifying the graduate to be a technologist with knowledge of basic theory supported by field training.

Degree Programs Outline

Specific degree requirements for the programs are shown in the following pages. Each program requires the full–time student to complete five semesters for associate degrees and eight semesters for baccalaureate degree. If a student wishes to carry less than a full course load, he may do so by extending his program over a longer period of time, up to a maximum of seven semesters.

A. All diploma programs have unified structure of general elective courses, general complementary courses, and general core courses. All the general elective courses are offered by the College of Basic education and the College of Business Studies. Moreover, a course on Islamic Culture, among the general complementary courses, is offered by the College of Basic Education.

Type of Courses	Credit Hours
General Core Courses	21
General Compulsory Courses	6
General Elective Courses	3
Major Core Courses	51
Major Elective Courses	6
Total	87

Diploma Programs General Elective Courses – (3) Credits

Code	No.	Course Name	Credits	Prerequisite
15	114	Industrial Psychology	2	
08	110	Physical Education	1	
07	141	Art Education (1)	1	
07	142	Art Education (2)	1	07–141
13	151	Music Education	1	
21	164	Accounting	2	
25	166	Industrial Economics	2	
10	104	Research and Libraries	1	
22	104	Entrepreneurship Management	2	
03	112	Work Ethics and Loyalty	3	

Diploma Programs General Compulsory Courses – (6) Credits

Code	No.	Course Name	Credits	Prerequisite
01	101	Islamic Culture	2	
64	252	Industrial Management	2	
81	298	Industrial Safety	2	30–101

Diploma Programs General Core Courses – (21) Credits

Code	No.	Course Name	Credits	Prerequisite
64	103	Engineering Drawing	2	
64	105	Workshop Technology	1	
76	105	Mathematics (1)	3	
76	106	Mathematics (2)	3	76–105
56	113	Basic Physics	3	
30	099	English Language (Intensive) *	0	
30	101	English Language (1)	3	
30	170	English Language (2)	3	30–101
60	182	Computers	3	

** Waived for students passing English language proficiency test*

B. The baccalaureate in engineering technology degree program has the following structure and outline:

Type of Courses	Credit Hours
Social Science and Humanities	21
Mathematics	12
Natural Science	12
College Requirements	21
Chemical Engineering Technology	66
Total	132

The program is designed to provide graduates with knowledge and skills in one of four major technology tracks of chemical engineering technology:

1. Petroleum Technology.
2. Chemical Processing Technology.
3. Water and Environment Technology.
4. Industrial Safety Technology.

Baccalaureate Program College Requirements – (21) Credits

Code	No.	Course Name	Credits	Prerequisite
64	101B	Engineering Drawing	2	
60	151B	Introduction to Computing	3	76–101B
55	221B	Industrial Safety	2	30–151B
57	111B	Statics	3	56–101C
70	221B	Electrical Circuits	3	56–151B
75	151C	Organic Chemistry	3	75–101C
75	152B	Organic Chemistry Laboratory	1	+75–151B
75	241B	Analytical Chemistry	3	75–101C
75	242B	Analytical Chemistry Laboratory	1	+75–241B

Baccalaureate Program Social Science and Humanities, Core Courses – (15) Credits

Code	No.	Course Name	Credits	Prerequisite
30	101B	English (1)	3	
30	151B	English (2)	3	30–101B
30	201B	Technical Report Writing	3	30–151B
01	102B	Islamic Culture	3	
03	231B	Loyalty and Work Ethics	3	

Baccalaureate Program Social Science and Humanities, Elective Courses – (6) Credits

Code	No.	Course Name	Credits	Prerequisite
22	104B	Est. and Man. of Small Business.	3	
03	105B	Islamic Arabic Civilization	3	
15	107B	Introduction to Psychology	3	
03	115B	Kuwait and Development	3	
02	101B	Language Drills	3	
02	102B	Readings and Styles	3	
14	384B	Research Methods	3	

Baccalaureate Program Mathematics and Natural Sciences – (24) Credits

Code	No.	Course Name	Credits	Prerequisite
76	101B	Math (1)	3	
76	102B	Math (2)	3	76–101B
76	201B	Applied Math for Engineers (1)	3	76–102B
76	202B	Applied Math for Engineers (2)	3	76–201B
56	101C	Physics (1)	3	
56	105B	Physics Laboratory (1)	1	
56	151B	Physics (2)	3	56–101C
56	155B	Physics Laboratory (2)	1	+56–151B
75	101C	General Chemistry	3	
75	105B	General Chemistry Laboratory	1	+75–101C

Departments
&
Programs

Department of Automotive Mechanics and Marine Engineering Technology

Overview:

The department aims at preparing the students to occupy positions in the technical departments of automotive and marine industry and to give them a solid technological and scientific basis upon which they can advance toward higher qualifications.

Students studying for major in Automotive Mechanics are educated both practically and theoretically in the technology of various types of power–driven vehicles. The students are acquainted with the operation, maintenance, and repair of all components of the various transportation vehicles.

The students studying for major in Marine Engineering Technology are trained in such a manner that they acquire the skills to operate, maintain and repair various ship systems. The curriculum covers subjects ranging from marine engineering to naval architecture and ship construction. The study is complemented by extensive workshop, laboratory, and field training in the marine field. Students are trained in such a manner that they can work on board ships as technical staff.

Majors:

The department offers two areas of specialization:

- Automotive Engineering Technology
- Marine Engineering Technology

Laboratories

The Automotive Mechanics and Marine Engineering Technology Department is equipped with a series of laboratories and workshops for serving the study curriculum:

- Automotive Electrical Laboratory
- Automotive Simulators Laboratory
- Automotive Testing Laboratory
- Automotive Workshops
- Auxiliary Machinery Workshop
- Diesel Laboratory
- Gasoline Fuel System Laboratory
- Internal Combustion Laboratory
- Marine Power Plant Simulator
- Naval Architecture Laboratory
- Projects and Research Laboratory

Department of Automotive Mechanics and Marine Engineering Technology

Major: Automotive Engineering Technology

Code: 0403–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
65	102	Material Technology	3	
65	111	Automotive Engines Technology	3	
65	112	Thermodynamics for Automotive Engines	3	
65	121	Power Transmission Technology (1)	3	
65	200	Field Training (1) *	2	
65	202	Applied Mechanics	3	65–121
65	203	Automotive Technical Drawing	3	64–103
65	211	Gasoline Injection Systems	3	65–111
65	212	Diesel Fuel Systems	3	65–111
65	213	Internal Combustion Engines	3	65–112
65	222	Power Transmission Technology (2)	3	65–121
65	223	Chassis Technology	3	65–121
65	231	Engine Electrical and Electronic Systems	3	65–111
65	251	Automotive Maintenance	3	65–211
65	300	Field Training (2) **	4	65–200
65	332	Chassis Electrical and Electronic Systems	3	65–231
65	352	Automotive Diagnostics	3	65–231

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
65	123	Heavy Equipment Technology	2	65–121
65	153	Transportation Economics	2	
65	204	Automotive Accident Analysis	2	65–202
65	214	Fuel and Combustion in Auto. Engines	2	65–111
65	233	Hybrid and Electric Vehicles	2	65–231
65	234	Automotive HVAC Systems	2	65–112, 65–231
65	254	Planning of Service Stations	2	65–223
65	335	Modern Automotive Systems	2	65–231
65	355	Project	2	

Department of Automotive Mechanics and Marine Engineering Technology

Major: Marine Engineering Technology

Code: 0405–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
51	111	Fluid Mechanics	3	
51	112	Thermodynamics	3	
51	113	Engineering Mechanics	3	
51	121	Naval Architecture and Ship Construction	3	
51	155	Machining Processes (1)	2	64–105
51	200	Field Training (1) *	2	
51	224	Computer Applications in Marine Engineering	2	51–121, 69–182
51	231	Marine Diesel Plants (1)	3	51–112
51	232	Steam Engineering	3	51–112
51	234	Marine Diesel Plants (2)	3	51–231
51	243	Auxiliary Machinery	3	51–111
51	244	Ship Systems	3	51–121
51	245	Marine Propulsion Systems	3	51–111
51	246	Electrical Machines	3	
51	247	Refrigeration and Air Conditioning	3	51–112
51	255	Machining Processes (2)	2	51–155
51	300	Field Training (2) **	4	51–200
51	362	Ship Maintenance	3	51–231

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
51	222	Shipyard Technology	2	51–121
51	223	Small Boat Technology	3	51–121
51	226	Introduction to Offshore Technology	2	
51	235	Marine Diesel Plant Simulator*	3	51–231, 51–243
51	236	Marine Steam and Gas Turbines	3	51–232
51	248	Automation and Control	3	51–111
51	249	Marine Safety	2	51–121
51	277	Marine Pollution	1	
51	278	Shipping Management	1	
51	285	Project**	2	

COURSE DESCRIPTION

Department of Automotive Mechanics and Marine Engineering Technology

51–111 Fluid Mechanics

Credits: 3 Hrs.: 4

Properties of fluids. Fluid statics: pressure and pressure measurement. Forces on immersed plane surfaces and application to ship tanks and bulkheads. Fluid flow, continuity equation, Bernoulli's equation, velocity and flow measurement. Momentum and forces in fluid flow, fluid impact, jet propulsion. Dimensional analysis, similarity laws, ship model experiments, and Froude and Reynolds numbers.

51–112 Thermodynamics

Credits: 3 Hrs.: 4

The state of working substance; Perfect gases; Gas Laws; heat and work; gas processes; the first law for non–flow processes; the steady flow equation; conservation of energy; flow processes; gases and vapors; reversible and non–reversible processes; the second law; entropy; heat engine cycles: Otto cycle, Diesel cycle, dual combustion cycle, gas turbine cycle, and steam cycle.

51–113 Engineering Mechanics

Credits: 3 Hrs.: 4

Concurrent and non–concurrent force systems, position and force vectors; equilibrium of force systems for particles and rigid bodies; application to ship cranes and steering gears; friction; work, energy and power; impulse and momentum; Newton's Second law; kinetics of particles and rigid bodies; gears; centroid and moment of inertia of area; application to midship section; and simple beams.

51–121 Naval Architecture and Ship Construction

Credits: 3 Hrs.: 4

Terminology of naval architecture. General arrangement of modern ship types; buoyancy; hull geometry; Simpson's rule; hydrostatic curves; metacentric height; fresh water allowance; initial stability; the inclining experiment; free surface effect; removal or addition of weights; hogging and sagging; racking stresses; slamming; framing systems; classification societies; and midship section of different ship types.

51–155 Machining Processes (1)

Credits: 2 Hrs.: 6

Fundamentals of metal cutting; measuring systems; precision measurements and meteorology; process accuracy and produced surface finish; hand tools and machine tools with emphasis on basic lathe operations; thread generation; electric arc welding: polarity, volt/Ampere curve, electrode identification, welding joints, and setting up welding machinery; oxy–acetylene welding and flame cutting; and inspection of welds.
Prerequisite: 64–105

51–200 Field Training (1)

Credits: 2 Hrs.: 8

Students spend 7 weeks in an industrial field such as shipyards, repair yards, marine salvage and firefighting centers, coast guard centers, and shipping companies, to get acquainted with real–life practices and problem solving. The student is enrolled in small groups under mutual supervision from college and industrial establishment to carry out work assignments.

51–222 Shipyard Technology

Credits: 2 Hrs.: 5

Ship design stages; shipyard layout; stockyard; material preparation stage; lofting operation (conventional, optical, and computer–aided lofting); sub assembly and assembly stages; erection; installation of machinery and shafting; launching methods; test trials and delivery; and docking and repair technology.
Prerequisite: 51–121

51–223 Small Boat Technology

Credits: 3 Hrs;: 4

Types of small boat hulls. Boat geometry and hydrostatics. An introduction to the building of yachts and small craft with emphasis on fiberglass construction and with secondary consideration given to wood and metal. Electrical and mechanical systems: DC electric theory and batteries, pumping systems, refrigeration, hydraulics, and deck hardware. Power estimation and propeller sizing.
Prerequisite: 51–121

51–224 Computer Applications in Marine Engineering

Credits: 2 Hrs.: 6

Creating engineering graphics. Application of spreadsheet calculations to marine engineering and naval architecture problems; data plotting. Application of computer marine drafting software: creating technical drawings, layers and dimensioning. Drawing ship lines. Introduction to programming, logic, and control structures.
Prerequisite: 51–121, 69–182

51–226 Introduction to Offshore Technology

Credits: 2 Hrs.: 2

An introduction to offshore drilling systems; oil and gas production systems; types of drilling rigs; mooring and anchor handling; subsea equipment; tanker loading terminals and buoy systems; support systems and logistics; pipe laying techniques; salvage and rescue operations; diving and submersibles; role of classification societies; and supply and workboats.

51–231 Marine Diesel Plants (1)

Credits: 3 Hrs.: 6

Principles of 2– and 4–stroke diesel engines; requirements for marine diesel engines; engine structure: cylinders, cylinder heads and combustion chambers; valves; pistons and piston rings; crankshafts; flywheels; vibration dampers; marine fuel types properties; injection pumps and injectors for marine diesel engines; timing diagrams; indicator diagrams; power calculations; and low–speed marine diesel engines.
Prerequisite: 51–112

51–232 Steam Engineering

Credits: 3 Hrs.: 4

Steam cycles; main components of marine steam plants: boilers, turbines, marine condensers, condensate pumps, deaerators, feed pumps, and heaters; economizers; boiler types, specifications, construction, and operation, control; fuel systems; draft systems; superheaters and desuperheaters; water treatment; marine auxiliary boilers; heat recovery; marine steam turbines: construction, operation, and control.
Prerequisite: 51–112

51–234 Marine Diesel Plants (2)

Credits: 3 Hrs.: 6

Engine scavenging; air intake and supercharging; Turbochargers; exhaust systems; engine lubrication oils and systems; marine engines cooling systems; salt water system; starting and reversing of marine engines; mixing tanks; governors; engine heat balance; engine performance at part loads; troubleshooting; emergency marine generators and engine monitoring; and engine shutdown.
Prerequisite: 51–231

51–235 Marine Diesel Plant Simulator

Credits: 3 Hrs.: 6

Engine room arrangement; identification of systems and components; engine cold start; emergency generators; compressed air starting system; shore connections; continuous operation of engine; engine shutdown; diesel generators; turbo–generators; synchronizing generators; power distribution; boiler operation; and engine room blackout and emergency procedures.
Prerequisite: 51–231, 51–243

51–236 Marine Steam and Gas Turbines

Credits: 3 Hrs.: 4

Thermodynamic process in turbines; impulse turbines and reaction turbines; blading; nozzles and diaphragms; casing and foundation; sealing; auxiliary turbines; lubricating systems, oil purifiers; bearings; marine reduction gears; couplings; throttles and controls; governors; over–speed devices; turbine operation monitoring; gas turbines; compressors; combustion chambers; and control of gas turbines.
Prerequisite: 51–232

51–243 Auxiliary Machinery

Credits: 3 Hrs.: 6

Pumps: types of marine pumps and their applications; rotor dynamic pumps: centrifugal pumps, mixed flow pumps, and axial flow pumps; positive displacement pumps: reciprocating and rotary pumps (screw and gear pumps); factors affecting pump performance; marine heat exchangers; air compressors; marine distilling plants; marine sanitation systems; and marine oily water separators and purifiers.
Prerequisite: 51–111

51–244 Ship Systems

Credits: 3 Hrs.: 4

Steering system: types of rudders; rudder carrier and pintles; design requirements of steering gear; types of steering gear: hydraulic, electric, and electrohydraulic; anchoring systems; windlass and capstan arrangement on the deck; mooring of ship: arrangement of mooring lines; cargo handling gear; cargo access and automatic hatch covers; and ship piping systems: bilge, ballast, fresh water, etc.
Prerequisite: 51–121

51–245 Marine Propulsion Systems

Credits: 3 Hrs.: 4

Ship resistance; model testing; powering; types of marine power plants; fuel consumption calculations; engine room layout; shafting: arrangement, loads, bearings, stern tubes, thrust blocks, alignment, reduction gears; torsional vibrations; combined marine power plants; marine propellers; propeller geometry; propeller theory; cavitation; different types of marine propellers.
Prerequisite: 51–111

51–246 Electrical Machines

Credits: 3 Hrs.: 4

Basic electrical concepts and relationships; DC electric circuits; series and parallel circuits; capacitors and inductors; electromagnetic induction; sources of electrical power onboard ships; system configuration; storage batteries; DC generators; AC generators; main and emergency generator, shaft generator; load analysis; switchboards; shipboard cabling and installations; and lighting systems on ships.

51–247 Refrigeration and Air Conditioning

Credits: 3 Hrs.: 4

Refrigeration cycles and components; refrigerants and lubricants; operation, maintenance and troubleshooting of refrigerating systems; air conditioning theory; properties of air; air conditioning systems and components; operation, maintenance and troubleshooting of air conditioning systems. The marine environment and special requirements for marine refrigeration systems.
Prerequisite: 51–112

51–248 Automation and Control

Credits: 3 Hrs.: 4

Pressure, temperature, level, flow and other measuring devices; automatic control system analysis and performance; concepts of on/off, proportional, integral, derivative control schemes; automatic control valves; pneumatic and electronic control principles and systems; typical shipboard control systems, e.g. fuel, cooling systems; and engine room controls.
Prerequisite: 51–111

51–249 Marine Safety

Credits: 2 Hrs.: 2

Relevant IMO conventions concerning safety of life at sea; types of hazards; fire protection equipment: fire detection systems, fire main systems, CO_2 and foam extinguishing systems, hand portable and semi–portable fire extinguishers; life–saving appliances: lifeboats, life rafts, PFDs, exposure suits, ring life buoys, and ship's distress signals; and safe handling of dangerous, hazardous, and harmful cargoes.
Prerequisite: 51–121

51–255 Machining Processes (2)

Credits: 2 Hrs.: 6

Setting up of milling machines (horizontal and vertical), drill presses, hydraulic press, and vertical band saw; knurls, shoulders, cuts off in lathe using proper procedures; operating various machines and finishing products according to blueprint specifications; pipe threading and welding; cutting methods using oxyfuel torch and associated equipment; Plasma arc cutting process; and gas tungsten arc welding.
Prerequisite: 51–155

51–277 Marine Pollution

Credits: 1 Hrs.: 1

Sources of marine pollution; types of marine pollutants; natural processes acting on spilled oil (weathering); containment and recovery of oil; treatment of recovered oil; shipboard oil pollution contingency plan; implementation of MARPOL 73/78 Convention; control of oil from machinery; discharge criteria; oil record book; oil and hazardous material transfer operations; and rules for tankers carrying oil in bulk.

51–278 Shipping Management

Credits: 1 Hrs.: 1

Introduction to the maritime transport industry; international shipping organizations; supply and demand in maritime transport; multi modal transport; containerization; container terminal operations; logistics information systems; maritime law; commercial arbitration; marine insurance; cargo claims; liabilities; P&I Clubs; and legal aspects in ports.

51–285 Project

Credits: 2 Hrs.: 4

Teams of several students conceive and complete a marine design project under the supervision of a faculty member, most often in one of the fields they studied, namely, marine power plants, auxiliary machinery, ship systems, naval architecture, propulsion systems, or small boat technology. Oral presentation and written report are required.

51–300 Field Training (2)

Credits: 4 Hrs.: 16

This is a continuation of Field Training (1). Students spend 14 weeks in an industrial plant, such as shipyards, repair yards, marine salvage and firefighting centers, coast guard workshops, and shipping companies, to participate in real–life practices and daily work routines. The student is enrolled in small groups to carry out scheduled assignments under the mutual supervision from the college and industrial establishment.
Prerequisite: 51–200

51–362 Ship Maintenance

Credits: 3 Hrs.: 6

Maintenance policies; duties and responsibilities of workers and supervisors; use of personal safety equipment; types of maintenance schemes: corrective, preventive, and predictive maintenance; maintenance scheduling; inspection, maintenance and repair of main engine and auxiliaries; hull inspection and maintenance; docking arrangements; computerization of planned maintenance systems.
Prerequisite: 51–231

65–102 Material Technology

Credits: 3 Hrs.: 4

Atomic structure and bonding, properties (physical, chemical, electrical, and mechanical), strength, selection, and heat treatment of the automotive materials (steel and cast iron alloys, non–ferrous alloys, rubber, plastics, and fiberglass).

65–111 Automotive Engines Technology

Credits: 3 Hrs.: 5

Operating principles and working cycles for automotive engines. Construction, functions, and materials of engine parts. Construction and theory of operation of engine cooling and lubrication systems. Troubleshooting and service procedures for automotive engines. Procedures for disassembly and reassembly of engine parts.

65–112 Thermodynamics for Automotive Engines

Credits: 3 Hrs.: 4

Heat and properties of matter. Thermodynamics and gas properties. Air standard cycles. Air fuel cycles. Methods of heat transfer and their relation to thermodynamics. Heat exchangers.

65–121 Power Transmission Technology (1)

Credits: 3 Hrs.: 5

Skills and knowledge in the area of automotive manual transmissions/transaxles and driveline components. This includes the types, functions, construction, operation, inspections, troubleshooting and servicing of front, rear, and all–wheel drives used in passenger cars and light trucks.

65–123 Heavy Equipment Technology

Credits: 2 Hrs.: 3

Heavy equipment types, construction, theory of operation, performance characteristics and productivity rates. General hydraulic, pneumatic control, and power transmission systems.
Prerequisite: 65–121

65–153 Transportation Economics

Credits: 2 Hrs.: 3

Factors affecting automotive transportation and how they affect it. Selection of transportation unites. Fixed and variable transportation costs. Transportation cost optimization.

65–200 Field Training (1)

Credits: 2 Hrs.: 8

Field training in modern commercial and hierarchical methods. Troubleshooting, using of testing equipment, and repairing of automotive systems, including engines and fuel systems.

65–201 Automotive Mechanics

Credits: 2 Hrs.: 3

Safety rules in automotive workshops and service stations. Most common used tools and equipment. Automotive main parts and their functions: engine, power transmission system, suspension system, steering system, brake system, and basic electrical circuit. Maintenance and daily inspection training. Study of air pollution sources, emitted exhaust gases components (characteristics and control).

65–202 Applied Mechanics

Credits: 3 Hrs.: 4

Force, torque, speed, and power through automotive components such as bearings, gears, belts, tires, brakes, and clutches; lifting mechanisms and applications on vehicle stability.
Prerequisite: 65–121

65–203 Automotive Technical Drawing

Credits: 3 Hrs.: 5

Fundamentals of mechanical drawing, assembly drawing of automotive mechanical parts, automotive circuit diagrams, and charts (engine performance, pressure crank angle, valve timing, and vehicle performance). Using AutoCAD in automotive technical drawing.
Prerequisite: 64–103

65–204 Automotive Accident Analysis

Credits: 2 Hrs.: 3

Energy and momentum. Vehicle dynamics of different driving conditions. Vehicle stability and effect of loading (solid and liquid). Types of vehicle body deformations after accidents and analysis of traffic accidents.
Prerequisite: 65–202

65–211 Gasoline Injection Systems

Credits: 3 Hrs.: 4

Gasoline fuel systems, and emission controls with particular emphasis placed on microprocessor control systems. Injection systems construction, operation, testing, replacing and theory of operation of emission control devices are covered in detail. Also, the following topics are covered: tanks, fuel lines, fuel rails, pumps, filters, and manifolds.
Prerequisite: 65–111

65–212 Diesel Fuel Systems

Credits: 3 Hrs.: 6

Different types of diesel fuel systems, construction, theory of operation advantages and disadvantages, disassembling and reassembling, testing, and service procedures of each type. Different electronically controlled systems will also be covered.
Prerequisite: 65–111

65–213 Internal Combustion Engines

Credits: 3 Hrs.: 4

Fuel structure and properties. Combustion in gasoline and diesel engines (normal and abnormal combustion and combustion chambers). Scavenging and charging systems (types, operation, control, advantages, and their effect on engine performance). Parameters affecting engine performance (indicated power and brake power, torque, and fuel consumption) and how they affect it. Engine heat balance, volumetric, thermal, and mechanical efficiencies.
Prerequisite: 65–112

65–214 Fuel and Combustion in Automotive Engines

Credits: 2 Hrs.: 3

Hydrocarbon and alternative fuels: sources, physical and chemical properties. Combustion chemistry and ideal combustion. Combustion process in SIE & CIE and control. Comparative study of engine performance using different fuels. Combustion pollutants.
Prerequisite: 65–111

65–222 Power Transmission Technology (2)

Credits: 3 Hrs.: 5

Skills and knowledge in the area of automatic transmissions/transaxles and driveline components for automatic transmissions. This includes the types, function, construction, operation, inspections, troubleshooting, and servicing of four-wheel drive power transmission devices used in different vehicles.
Prerequisite: 65–121

65–223 Chassis Technology

Credits: 3 Hrs.: 6

Automotive frame. Wheels and tires. Steering geometry and wheel alignment. Types including advanced, construction, theory of operation and service procedures for the following: steering, suspension, and brake systems.
Prerequisite: 65–121

65–231 Engine Electrical and Electronic Systems

Credits: 3 Hrs.: 4

Fundamentals of electric and electronic circuits. Study of the function, construction, operation, testing, diagnosing, and servicing of stating battery, automotive ignition systems, cranking systems, and charging systems using a variety of diagnostic test equipment.
Prerequisite: 65–111

65–233 Hybrid and Electric Vehicles

Credits: 2 Hrs.: 4

Advantages of conventional automotive and advantages of hybrid and electric cars. Types, characteristics, operation, construction, and performance of hybrid and electric cars and their components; operating economics of hybrid and electric cars.
Prerequisite: 65–231

65–234 Automotive HVAC Systems

Credits: 2 Hrs.: 4

Automotive, heating, ventilation, and air conditioning systems, construction theory of operation, diagnosis, and repair. Environmental safety issues are stressed, including law and regulations, CFC's recovery and recycling, ozone depletion, and the new environmentally safe systems.
Prerequisite: 65–112, 65–231

65–251 Automotive Maintenance

Credits: 3 Hrs.: 6

Factors affecting vehicle life, wear of automotive parts (types, measuring, minimizing, and limits), periodical maintenance and repair (types, planning, man power, materials, and spare parts), Planning of maintenance places, car parking, and stores of materials and spares.
Prerequisite: 65–211

65–254 Planning of Service Stations

Credits: 2 Hrs.: 3

Organization and administration, work planning, determination of working areas, labor, man power, equipment, tools, costing, and spare parts inventory of automotive service stations.
Prerequisite: 65–223

65–300 Field Training (2)

Credits: 4 Hrs.: 16

Field training in modern commercial and hierarchical methods. Troubleshooting, use of testing equipment, and repair of all automotive systems.
Prerequisite: 65–200

65–332 Chassis Electrical and Electronic Systems

Credits: 3 Hrs.: 5

Theory, diagnosis, and repair of chassis electrical systems and electronic systems. This includes the study of lighting circuits, wipers, center lock, electric windows circuits, electronic dash circuits, electronic cruise control, and other related circuits.
Prerequisite: 65–231

65–335 Modern Automotive Systems

Credits: 2 Hrs.: 4

Principles, concepts and definitions, and components of automotive control systems. Modern control systems of the following: engine, power transmission, suspension, steering, brake, safety, and stability systems.
Prerequisite: 65–231

65–352 Automotive Diagnostics

Credits: 3 Hrs.: 4

Diagnosing concepts, conventional and hierarchical methods, and diagnosing equipment. General troubleshooting of vehicle systems, including preparation of troubleshooting planes and use of testing equipment. Use of electronic diagnosing equipment for different automotive electronic systems.
Prerequisite: 65–231

65–355 Project

Credits: 2 Hrs.: 4

Practical training to be carried out in an automotive workshop laid out by the department in different automotive fields.

Department of Chemical Engineering Technology

Overview:

The programs of the Department of Chemical Engineering Technology aim to give the student a thorough understanding of chemical engineering by combining theoretical aspects of the discipline with hands–on practical experience, all taught within a friendly and informal atmosphere through five–semester educational and training programs. The graduate will be able to enter and succeed in working in petroleum refineries and chemical industry. The program graduate is an 'Assistant Engineer', and can serve in operation, maintenance, and safety inspection of chemical and petroleum industry.

Programs:

This department was established in 1976/1977 as part of Kuwait Institute for Applied Technology offering a single applied education program on 'Unit Operation' until it was replaced in 1980 by two majors on 'Chemical Industries' and 'Petroleum Industries'. The two majors were under continuous revision based on job market needs, industry required skills, and technology progress to emerge as

- Refinery Operation Technology
- Chemical Industries Technology

The department offered a baccalaureate in engineering technology that started in the 2012–2013 academic year. The program has four different technology tracks directed to serve workforce markets.

1. Petroleum Technology Track.
2. Chemical Processing Technology Track.
3. Water and Environment Technology Track.
4. Industrial Safety Technology Track.

Department Laboratories

The department runs eleven laboratories, all equipped with state–of–art experimental apparatus to simulate and analyze professional aspects of chemical process technology and refinery operation technology:

- General Chemistry Laboratory
- Physical Chemistry Laboratory
- Fluid Mechanics Laboratory
- Water Technology Laboratory
- Heat Transfer Laboratory
- Mass Transfer Laboratory
- Corrosion Laboratory
- Petroleum Refining Laboratory
- Petroleum Products Testing Laboratory
- Process Control Laboratory
- Air Pollution Laboratory

Department of Chemical Engineering Technology

Major: Refinery Operation Technology

Code: 0443–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
82	122	General Chemistry	3	
82	123	Physical Chemistry	3	82–122
81	163	Oil and Natural Gas	3	82–122
82	183	Chemical Engineering Calculations	3	76–105, 82–122
81	190	Fluid Mechanics	3	56–113
81	200	Field Training (1) *	2	
82	264	Industrial Corrosion	3	82–122
81	275	Petroleum Products Testing	3	81–276
81	276	Refinery Processes	3	81–163
82	281	Computer Appl. in Chemical Engineering	3	69–182, 81–283
81	283	Thermodynamics	3	82–123
81	291	Heat Transfer	3	81–190
81	293	Reactor Technology	3	82–183
81	297	Measurements and Control	3	76–106, 81–293
81	300	Field Training (2) **	4	81–200, 81–276, Co– 81–394
81	392	Mass Transfer	3	81–291
81	394	Refinery Operation and Safety	3	81–297, 81–298, 81–392, Co–81–300

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
82	163	Water Technology	3	82–183
82	276	Chemical Processes	3	82–183
81	284	Industrial Pollution	3	82–183
81	287	Fuel and Furnaces Technology	3	82–183
82	301	Applications in Chemical Engineering	3	82–281
81	302	Project	3	81–276
81	303	Catalysts and Chemical Additives	3	81–293
82	336	Fertilizers	3	82–183
81	337	Polymers	3	82–122
82	337	Minerals Technology	3	82–264
82	394	Physical Separation	3	81–392

Department of Chemical Engineering Technology

Major: Chemical Industries Technology

Code: 0444–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
82	122	General Chemistry	3	
82	123	Physical Chemistry	3	82–122
82	163	Water Technology	3	82–183
82	183	Chemical Engineering Calculations	3	76–105, 82–122
81	190	Fluid Mechanics	3	56–113
82	200	Field Training (1) *	2	
82	264	Industrial Corrosion	3	82–122
82	275	Quality Control	3	69–182
82	276	Chemical Processes	3	82–183
82	281	Computer Appl. in Chemical Engineering	3	69–182, 81–283
81	283	Thermodynamics	3	82–123
81	291	Heat Transfer	3	81–190
81	293	Reactor Technology	3	82–183
81	297	Measurements and Control	3	76–106, 81–293
82	300	Field Training (2) **	4	82–200, 82–281, 81–297, Co– 82–393
81	392	Mass Transfer	3	81–291
82	393	Equipment Operation and Safety	3	81–298, 81–392, 82–276, Co– 82–300

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
81	163	Oil and Natural Gas	3	82–122
81	276	Refinery Processes	3	81–163
81	284	Industrial Pollution	3	82–183
81	287	Fuel and Furnaces Technology	3	82–183
82	301	Applications in Chemical Engineering	3	82–281
81	302	Project	3	82–276
81	303	Catalysts and Chemical Additives	3	81–293
82	336	Fertilizers	3	82–183
81	337	Polymers	3	82–122
82	337	Minerals Technology	3	82–264
82	394	Physical Separation	3	81–392

Department of Chemical Engineering Technology

Major: Chemical Engineering Technology (Baccalaureate)

1. Major Core Courses

(48 Credits)

Code	No.	Course Name	Credits	Prerequisite
55	151B	Introduction to Chem. Eng. Tech.	3	75–151C, 76–101B
55	231B	Physical Chemistry	3	75–101C
55	232B	Physical Chemistry Laboratory	1	75–101C
55	251B	Transport Phenomenon	3	55–151B, 76–201B
55	252B	Unit Operations Laboratory (1)	2	55–151B, 76–201B
55	261B	Chemical Eng. Thermodynamics	3	55–151B, 55–231B
55	361B	Computer App. in Chem. Eng.	3	55–251B, 60–151B
55	351B	Equipment Operation and Safety	3	55–221B, 55–251B
55	321B	Chemical Reaction Engineering	3	55–251B, 55–261B
55	331B	Environmental Engineering	3	55–151B
55	381B	Unit Operations	3	55–251B
55	302B	Unit Operations Laboratory (2)	2	55–252B
55	391B	Process Dynamics and Control	3	55–321B
55	392B	Process Dynamics and Cont. Lab.	1	+55–391B
55	402B	Equipment Sizing and Selection	3	30–201B, 55–381B
55	451B	Process Model., Sim., and Opt.	3	55–361B, 55–391B
55	291B	Field Training (1)	3	55–251B
55	401B	Field Training (2)	3	55–291B, 55–391B

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
55	211B	Material Science and Corrosion	3	55–151B
55	461B	Quality Control	3	76–202B
55	463B	Pharmaceutical Technology	3	55–381B, 75–151C
55	467B	Oil Upstream Operations	3	55–381B
55	468B	Biotechnology	3	55–321B, 55–381B
55	469B	Special Top. in Chem. Eng. Tech.	3	55–402B
55	471B	Project in Chem. Eng. Tech.	3	30–201B, 55–401B
55	492B	Advanced Process Control	3	55–391B

3. Technology Track Requirements Courses

(9) Credits

Track One: Petroleum Technology Code: 046501–BA

Code	No.	Course Name	Credits	Prerequisite
55	403B	Refining Processes	3	55–381B
55	404B	Refining Products and Testing	3	75–241B, 55–403B
55	407B	Catalysis	3	55–321B

Track Two: Chemical Processing Technology Code: 046502–BA

Code	No.	Course Name	Credits	Prerequisite
55	411B	Chemical Processes Technology	3	55–381B
55	415B	Polymer Technology	3	55–321B
55	413B	Separation and Mixing Processes	3	55–381B, 75–241B

Track Three: Water and Environment Technology Code: 046503–BA

Code	No.	Course Name	Credits	Prerequisite
55	421B	Water Desalination Technology	3	55–381B
55	423B	Wastewater Treatment	3	55–321B
55	441B	Pollution Manag. and Control	3	55–321B, 75–241B

Track Four: Industrial Safety Technology Code: 046504–BA

Code	No.	Course Name	Credits	Prerequisite
55	431B	Hazard Recog., Eval., and Control	3	55–351B
55	433B	Industrial Hyg. and Ergonomics	3	55–431B
55	435B	Safety Personnel Duties	3	55–431B

4. Courses Transferred to Diploma Graduates

(63) Credits

Code	No.	Course Name	Credits	Prerequisite
64	101B	Engineering Drawing	2	
60	151B	Introduction to Computing	3	
55	221B	Industrial Safety	2	
30	101B	English (1)	3	
01	102B	Islamic Culture	3	
03	231B	Loyalty and Work Ethics	3	
		Free Elective 1	3	
		Free Elective 1	3	
76	101B	Math (1)	3	
56	101C	Physics (1)	3	
56	105B	Physics Laboratory (1)	1	
75	101C	General Chemistry	3	
75	105B	General Chemistry Laboratory	1	
55	151B	Introduction to Chem. Eng. Tech.	3	
55	231B	Physical Chemistry	3	
55	232B	Physical Chemistry Laboratory	1	
55	251B	Transport Phenomenon	3	
55	252B	Unit Operations Laboratory (1)	2	
55	351B	Equipment Operation and Safety	3	
55	331B	Environmental Engineering	3	
55	291B	Field Training (1)	3	
		Major Elective 1	3	
		Major Elective 2	3	
		Major Elective 3	3	
Total			63	

COURSE DESCRIPTION

Department of Chemical Engineering Technology – Diploma Programs

81–163 Oil and Natural Gas

Credits: 3 Hrs.: 3

Basic geological concepts and the main techniques used in the petroleum technology field. Chemistry of natural gas and crude oil. Areas of sedimentary rocks, stratigraphy, exploration, drilling, oil well completion, desalter operation and gas and oil separation processes will be covered.
Prerequisite: 82– 123

81–190 Fluid Mechanics

Credits: 3 Hrs.: 5

It is an introductory for fluid mechanics and hydraulics, dealing with the basic principles of fluid flow, basic equations of continuity, energy and momentum, engineering aspects of flow measurement, pressure–drop calculations and pumping requirements, friction and drag studies, calibration and design of flow measuring devices, and flow characteristics of open and closed conduits. Also, equipment dealing with fluid handling, like pumps, compressor, piping systems, valves, joints, fittings, agitation and mixing of liquids. Laboratory studies demonstrating principles of fluid mechanics and applications fluids as fluid static, pressure and head fluid flow, viscosity.
Prerequisite: 56–113, 76–105

81–200 Field Training (1)

Credits: 2 Hrs.: 8

This course introduces the student to the work environment of a petroleum refinery unit. In this course the student is trained in a petroleum refinery unit, where he learns to; follow the safety regulations and use the safety equipment, construct a block flow diagram of the unit, study the feed and products quantities and properties, study the operating conditions, use the standardized equipment symbols to construct a process flow diagram of the unit, list the utilities their specifications and uses, and visit other related facilities in the refinery like the laboratories, the maintenance workshop and the corrosion department.

81–275 Petroleum Products Testing

Credits: 3 Hrs.: 4

Chemistry of petroleum products, blending processes, sampling and labeling of gases, liquid hydrocarbon & water. Standard specifications & evaluation of various types of petroleum products; liquefied petroleum gas (LPG), naphtha, gasoline, kerosene, aviation turbine kerosene (ATK), diesel oils, lubricating oils and asphalt are considered.
Prerequisite: 76–106

81–276 Refinery Processes

Credits: 3 Hrs.: 5

Refinery processes in the same order in which the crude flows through the refinery to show the purpose and interrelation of the processing unit. The basic aspect of current petroleum refining technology and economics are presented in systematic manner suitable for student in chemical engineering technology. The physical and chemical properties of petroleum are described, along with major refining processes.
Prerequisite: 81–283, 81–392

81–283 Thermodynamics

Credits: 3 Hrs.: 3

This course covers the basic concepts of thermodynamics, properties of pure substances, the first and second law of thermodynamics and their application to closed and open systems.
Prerequisite: 82–123

81–284 Industrial Pollution

Credits: 3 Hrs.: 3

Study of the global aspects of pollution and its social and economic impacts on the community. The study focuses on air and water pollution in the chemical industries and petroleum refining along with solid management and noise pollution. Sources of pollution and their impact on the environment will be assessed and methods of monitoring, control and legislation are reviewed. Pollution prevention and waste minimization techniques will be addressed to selected chemical industries and petroleum refining.
Prerequisite: 82–183

81–287 Fuel and Furnaces Technology

Credits: 3 Hrs.: 3

Refinery processes in the same order in which the crude flows through the refinery to show the purpose and interrelation of the processing unit. The basic aspect of current petroleum refining technology and economics are presented in systematic manner suitable for student in chemical engineering technology. The physical and chemical properties of petroleum are described, along with major refining processes.
Prerequisite: 82–183

81–291 Heat Transfer

Credits: 3 Hrs.: 5

This course covers mechanisms of heat transfer, conduction through solids of different shapes, convection, over–all heat transfer coefficient, radiation, and heat transfer equipment (heat exchangers, boilers, condensers, evaporators, furnace, and burners.
Prerequisite: 82–123

81–293 Reactor Technology

Credits: 3 Hrs.: 3

The course familiarizes the student with the fundamentals of chemical kinetics. Catalysts types (Deactivation, Regeneration, Poisoning, cocking, Loading). Optimum operating conditions (Temperature, Pressure, Flowrates etc.). Monitoring and controlling of the rate of reaction. Types of reactors, problems in reactors: channeling, runaway temperature, deactivation etc. Catalyst in refinery processes and loading of catalysts. Starting up and shutting down of reactors. The course will familiarize the student with the different types of catalysts in the refinery and the chemical industries, solve simple mathematical problems concerning reactor technology (space velocity, rate of reaction, catalyst quantity and life cycle of catalyst).
Prerequisite: 82–183, 76–106

81–297 Measurement and Control

Credits: 3 Hrs.: 5

The course familiarizes the student with the vocabulary surrounding the instrument and control field as well as examining the function of each instrument. This includes the analysis of static and dynamic characteristics of processes and identifications; practical study of process control systems as applied to chemical process industries. An overview of basic control concepts followed by a study of sensing elements, transmitters controllers, control valves, elements of process dynamics, control system tuning and Distributive Control System (DCS) will be covered.
Prerequisite: 76–106, 81–293

81–298 Industrial Safety

Credits: 2 Hrs.: 2

The course will highlight the importance and objectives of industrial safety, principles of health and safety, general causes of accidents, economics of safety, types of industrial hazards, accident investigation and analysis, and protective wear.
Prerequisite: 30–101

81–300 Field Training (2)

Credits: 4 Hrs.: 16

In this course, the student is trained to perform the main tasks of a petroleum refinery operator in a safe conscious manner. In this course the student is trained to; follow the safety regulations and use the safety gear, operate rotary and stationary equipment, operate furnaces and boilers, monitor the operating conditions and perform necessary troubleshooting, handle different types of chemicals safely, sample process streams, prepare equipment for maintenance, deal with refinery equipment emergencies.
Prerequisite: 81–200, 81–275, 82–281

81–302 Project

Credits: 3 Hrs.: 3

Faculty–supervised term projects or research assigned to individual student or groups on new or developing areas in petroleum refining or in chemical industries; a written report and oral presentation are required.
Prerequisite: 81–276 or 82–276

81– 303 Catalysts and Chemical Additives

Credits: 3 Hrs.: 3

Different types of catalysts used for hydrocracking, hydro–treating, methanol synthesis and other process to show the role that these catalysts play in these processes. Also, the different types of chemical additives such as DEA, Corrosion will be covered.
Prerequisite: 81–276

81–337 Polymers

Credits: 3 Hrs.: 3

The elements of the chemistry, physics, processing methods, and engineering applications of polymers. Polymer processing and characterization of polymer products. Extrusion, injection molding, blown film production with mechanical, and thermal characterization.
Prerequisite: 82–123

81–392 Mass Transfer

Credits: 3 Hrs.: 5

The study of the principle of mass transfer, steady state molecular diffusion; diffusion in gases and liquids, principles of unsteady state diffusion and convective mass transfer coefficients, mass transfer coefficients for various geometries, stage and continuous gas–liquid separation processes, absorption in plate and packed towers, vapor–liquid equilibrium relations, distillation types, equipment, field of application and troubleshooting of distillation columns, distillation calculations, and two–phase hydrocarbon property determination, liquid–liquid and membrane separation processes.
Prerequisite: 81–190, 82–183

81–394 Refinery Operation and Safety

Credits: 3 Hrs.: 3

Main tasks of a petroleum refinery operator with a special emphasis on safety aspects of operation, including following safety regulations and using safety gear, operating rotary and stationary equipment, operating furnaces and boilers, monitoring operating conditions and troubleshooting, safe handling different types of chemicals, sampling process streams, preparing equipment for maintenance, and dealing with refinery equipment emergencies.
Prerequisite: 81–276, 81–297, 81–298

82–122 General Chemistry

Credits: 3 Hrs.: 5

The course covers the basics of inorganic, organic, and analytical chemistry. Also, the basic concepts of chemical reactions, stoichiometry, ionic equations and morality will be covered. Principles of oxidation numbers, reaction rates, chemical equilibrium, and acid–base theory will be included. An introduction to organic chemistry will also be covered.

82–123 Physical Chemistry

Credits: 3 Hrs.: 5

The course covers basic concepts and unit conversion, properties of pure substances, phase diagrams, property tables, equations of state, the first law of thermodynamics and applications for closed and open systems, the second and third laws of thermodynamics and applications; and chemical reaction equilibria. Laboratory experiments explore the principles of physical chemistry.
Prerequisite: 82–122

82–163 Water Technology

Credits: 3 Hrs.: 3

The course focuses on water sources and water treatment. This includes disinfection, softening, demineralization, filtration and desalination using distillation, reverse osmosis. In addition aspects of wastewater treatment will be covered.
Prerequisite: 82–123

82–183 Chemical Engineering Calculations

Credits: 3 Hrs.: 3

Basic calculations of material and energy balance of the chemical and petroleum industry processes. Calculations cover basic physical and chemical concepts, stoichiometry of chemical reactions, and combustion of fuels. Flow sheet diagrams, symbols, icons, and abbreviations for major components of processes are considered.
Prerequisite: 76–105, 82–122

82–200 Field Training (1)

Credits: 2 Hrs.: 8

Practical training for a period of 7 weeks (175 hours) in a chemical industrial facility. Emphasis is laid on the application of chemical principles (mass and energy balance), flow–sheeting, and safety regulations. Practice of engineering ethics, teamwork, and self–responsibility

82–264 Industrial Corrosion

Credits: 3 Hrs.: 3

The course shall help the student understand the cost of corrosion, differentiate between types of corrosion, apply engineering material selection as well as understands corrosion prevention and protection methods.
Prerequisite: 82–123, 30–170

82–275 Quality Control

Credits: 3 Hrs.: 4

Principle, role, management, and history of quality control in chemical industry; concepts, techniques, and procedures of quality control, preparation of statistical control charts and selection of suitable sampling plans; and fundamental concepts of reliability and experimental design.
Prerequisite: 76–106

82–276 Chemical Processes

Credits: 3 Hrs.: 5

Chemical processes in which raw materials flow through chemical plants to show the purpose and interrelation of the processing unit. The basic aspect of current chemical process technology and economics are presented in a systematic manner suitable for students in chemical engineering technology. The physical and chemical properties of raw materials and products are described, along with major chemical processes.
Prerequisite: 81–283, 81–392

82–281 Computer Applications in Chemical Engineering

Credits: 3 Hrs.: 4

The course focuses on the use of different computer application for data handling and simple numerical analysis in chemical engineering. The course includes the use of process simulation for the startup, shut down, control and optimization of major refinery units.
Prerequisite: 81–293, 81–291, 81–392

82–300 Field Training (2)

Credits: 4 Hrs.: 16

Practical training for a period of 15 weeks (300 hours) in a chemical industrial facility, Emphasis is laid on reactive processing, control systems, equipment sizing, selection and operation, and safety and environment.
Prerequisite: 82–200, 82–275, 82–281

82–301 Applications in Chemical Engineering

Credits: 3 Hrs.: 3

Selected topics in chemical engineering technology and innovations in industrial chemical processes.
Prerequisite: 82–281

82–336 Fertilizers

Credits: 3 Hrs.: 3

Production of inorganic fertilizers from raw materials (such as natural gas and other petroleum products, water, air, sulfur, phosphate rock, etc.), basic principles, processes, flow sheets, etc. for different fertilizers (nitrogenous, potassium, phosphate and complex fertilizers)
Prerequisite: 82–183

82–337 Minerals Technology

Credits: 3 Hrs.: 3

An overview of the structural, chemical, and optical properties of minerals. Mineral resources in the economy, the origin of ore deposits, mineral exploration, and processing techniques. Engineering applications are emphasized. Exploration and development topics are investigated. Introduction to the processing of mineral resources into metals. Environmental issues.
Prerequisite: 82–264

82–393 Equipment Operation and Safety

Credits: 3 Hrs.: 3

Main tasks of a chemical plant operator with a special emphasis on safety aspects of operation, including following safety regulations and using safety gear, operating rotary and stationary equipment, operating furnaces and boilers, monitoring operating conditions and troubleshooting, handling different types of chemicals safely, sampling process streams, preparing equipment for maintenance, and dealing with industrial equipment emergencies.
Prerequisite: 81–297, 82–276, 81–298

82–394 Physical Separation

Credits: 3 Hrs.: 3

Fundamental principles and design of separation processes, batch and continuous flow, concurrent and countercurrent cascade, plate and packed towers, distillation, absorption, extraction, fundamentals of mixing, basic design, evaluation, and optimization.
Prerequisite: 81–392, 81–291

COURSES DESCRIPTION

Department of Chemical Engineering Technology – Baccalaureate Program

64–101B Engineering Drawing

Credits: 2 Hrs.: 4

An introductory course in the fundamentals of engineering drawing and the basics of Computer Aided Drawing (CAD). Manual drafting techniques are integrated with extensive use of AutoCAD. Topics include use of the drawing instruments, geometric construction, orthographic projection, technical sketching, sectional and auxiliary views and proper dimensioning techniques.

60–151B Introduction to Computing

Credits: 3 Hrs.: 3

Operating systems and basic software applications in a windows–based environment; word processing; spreadsheets for solving systems of linear and nonlinear algebraic equations, plotting, fitting data, building new functions and making iterations and loops.
Prerequisite: 76–101B

55–221B Industrial Safety

Credits: 2 Hrs.: 2

Overview of industrial safety and general causes of accidents; industrial hygiene and loss statistics; safety economics; classification of hazards; hazard identification and risk assessment, personal protective equipment, ergonomics and Work related Musculoskeletal Disorders (WMSD's).
Prerequisite: 30–151B

57–111B Statics

Credits: 3 Hrs.: 3

Principles of mechanics force systems, equilibrium structures, distributed forces, centroids and friction.
Prerequisite: 56–101C

70–221B Electrical Circuits

Credits: 3 Hrs.: 3

Basic knowledge in Electrical Circuits, Electrical Variables, Basic electrical laws and elements, Electrical Power & Energy, Kirchhoff laws, Basic Circuit Analysis, basic electricity laws in DC and AC, RLC circuits, Power factor; Laboratory experiments investigates the principles of electrical circuits.
Prerequisite: 56–151B

75–151C Organic Chemistry

Credits: 3 Hrs.: 3

Basic fundamentals of organic chemistry: including nomenclature, chemical and physical properties, reactions and syntheses of the major classes of organic compounds; Laboratory experiments investigates the principles of organic chemistry.
Prerequisite: 75–101C

75–152B Organic Chemistry Laboratory

Credits: 1 Hrs.: 2

Laboratory experiments investigates the principles of organic chemistry.
Prerequisite: 75–101C

75–241B Analytical Chemistry

Credits: 3 Hrs.: 3

Chemical equilibrium; gravimetric analysis; titration; electrochemistry; spectroscopy and separations; instrumental methods of chemical analysis; evaluation of analytical data; Laboratory experiments investigates the principles of analytical chemistry.
Prerequisite: 75–101C

75–242B Analytical ChemistryLaboratory

Credits: 1 Hrs.: 2

Laboratory experiments investigates the principles of analytical chemistry.
Prerequisite: 75–101C

30–101B English (1)

Credits: 3 Hrs.: 3

Skills in listening, speaking, reading, and writing, with a special emphasis on reading; development of reading skills; developing critical thinking; respond to ideas in a well–organized written format; reading–related writing skills.

30–151B English (2)

Credits: 3 Hrs.: 3

Reinforcement of academic writing skills; writing of different types of essays based on the ideas they are exposed to in the reading selections; emphasis on the writing process from brain storming and outlining to producing a complete documented piece of writing.
Prerequisite: 30–101B

30–201B Technical Report Writing

Credits: 3 Hrs.: 3

Principles of organizing, developing, and writing technical information such as: preparation of project proposals and reports, professional oral presentation; report forms and rhetorical patterns common to scientific and technical disciplines; technical writing conventions; Numerous written assignments required.
Prerequisite: 30–151B

01–102B Islamic Culture

Credits: 3 Hrs.: 3

The impact of Islam on Arabic culture, cultural meaning of Islamic rules, and tradition of early Islamic communities.

03–231B Loyalty and Work Ethics

Credits: 3 Hrs.: 3

Professional ethics, of moral issues which are important and relevant to engineers, including: the social responsibility of engineers; conflicts of interest; intellectual property issues; codes of conduct; corporate responsibility and the ethics of whistle–blowing; environmental issues; morally acceptable levels of risk; and the moral implications of technology.

22–104B Establishing and Managing Small Businesses

Credits: 2 Hrs.: 2

Definition, criteria, forms and characteristics of small projects. Pioneering, foundation and implementation. Factors of success and failure. Planning and organization of small projects. Decision making, counseling and leadership, and supervision. Management of human resources. Financial and marketing management. Feasibility study and credit and revenue systems .

03–105B Islamic Arabic Civilization

Credits: 3 Hrs.: 3

The course deals with the concept of civilization, foundations and characteristics of Islamic civilization, Arab civilization before Islam, (the political system, the financial and administrative system, the judiciary system and its development, the military system), social life in Muslim countries, economic life, development of the education system in Islam, Islamic arts, cultural and ideological renaissance, Arabic and Islamic civilization systems, their features in science and literature, influence of the Arab and Islamic civilization on modern European renaissance.

15–107B Introduction to Psychology

Credits: 3 Hrs.: 3

This course discusses the principles of behavior, its influences and academic objectives, the well–known schools in psychological applications and methods of research, sensory organs of perceptions, glands and the nervous system, motives and emotions, memory, learning, intelligence and individual differences and behaviors of disturbances and their treatments.

03–115B Kuwait and Development

Credits: 3 Hrs.: 3

The course is an integrated study of the development of Kuwait, covering the historical, geographical, economic and demographic aspects. The course also deals with services offered as education and its reflection on development and cultural and scientific renaissance. Also, it deals with Kuwait's relations with the outside world.

76–101B Math (1)

Credits: 3 Hrs.: 3

Elementary analytic geometry, algebra, functions, limits of functions and continuity definition of derivatives and the techniques of differentiation; applications of the derivative; Anti–derivatives and indefinite integrals; definite integrals.

76–102B Math (2)

Credits: 3 Hrs.: 3

Definite integrals; applications and techniques of integration; logarithmic and exponential functions; inverse trigonometric and hyperbolic functions; improper integrals; infinite series.
Prerequisite: 76–101B

76–201B Applied Math for Engineers (1)

Credits: 3 Hrs.: 3

Ordinary differential equations; properties of special functions, solution methods including Laplace transforms, Fourier series, systems of linear differential equations, Partial differential equations with applications, introduction to optimization.
Prerequisite: 76–102B

76–202B Applied Math for Engineers (2)

Credits: 3 Hrs.: 3

Vector spaces, linear systems of equations, matrix operations, and linear transformations; statistics, linear regression and analysis of experimental data; probability distributions; complex variables.
Prerequisite: 76–201B

56–101C Physics (1)

Credits: 3 Hrs.: 3

Vectors; statics; uniform accelerated motion; energy; momentum; uniform circular motion; simple machines; elasticity, and simple harmonic motion; Laboratory experiments investigates the principles of elementary physics.

56–105B Physics Laboratory (1)

Credits: 1 Hrs.: 2

Laboratory experiments investigates the principles of elementary physics.

56–151B Physics (2)

Credits: 3 Hrs.: 3

Electricity and magnetism, light, and modern physics; Laboratory experiments investigates the principles of electricity and Magnetism.
Prerequisite: 56–101C

56–155B Physics Laboratory (2)

Credits: 1 Hrs.: 2

Laboratory experiments investigates the principles of electricity and Magnetism.
Corequisite: 56–151B

75–101C General Chemistry

Credits: 3 Hrs.: 3

Introduction to the fundamental principles of chemistry, including chemical stoichiometry; properties of gasses, liquids, and solids; solutions; chemical equilibria; atomic and molecular structure; introduction to thermodynamics; reaction kinetics.

75–105B General Chemistry Laboratory

Credits: 1 Hrs.: 2

Laboratory experiments investigates the principles of general chemistry.
Corequisite: 75–101C

55–291B Field Training (1)

Credits: 3 Hrs.: 20

Practical training for a period of 7 weeks in a chemical industrial facility; Emphasis on the application of chemical principles (mass and energy balance), flow sheeting, and safety regulations. Practice of engineering ethics, teamwork, and self–responsibility.
Prerequisite: 55–251B

55–401B Field Training (2)

Credits: 3 Hrs.: 20

Practical training for a period of 15 weeks in a chemical industrial facility; Emphasis on reactive processing, control systems, equipment sizing, selection and operation, safety and environment.
Prerequisite: 55–291B, 55–391B

55–151B Introduction to Chemical Engineering Technology

Credits: 3 Hrs.: 3

Basic Concepts and unit conversion; introduction to chemical engineering and chemical process industry; flow sheets fundamentals: units, concentrations, gasses and gas mixtures; steady state material and energy balances; introduction to unsteady state material and energy balance.
Prerequisite: 75–151C, 76–101B

55–231B Physical Chemistry

Credits: 3 Hrs.: 3

Properties of pure substances: Phase diagrams, Property tables, equations of state; The first law of thermodynamics and applications for closed and open systems; The second and third law of thermodynamics and applications; chemical reaction equilibria.
Prerequisite: 75–101C

55–232B Physical Chemistry Laboratory

Credits: 1 Hrs.: 2

Laboratory experiments investigates the principles of physical chemistry.
Co–requisite: 75–101C

55–251B Transport Phenomena

Credits: 3 Hrs.: 3

Formulation of the physical laws of momentum, heat, and mass transport, with emphasis on their interrelationship. Application of these principles to basic transport processes. Diffusive and convective transport mechanisms.
Prerequisite: 55–151B, 76–201B

55–252B Unit Operations Laboratory (1)

Credits: 2 Hrs.: 4

Laboratory studies demonstrating principles of fluid mechanics and heat transfer. Emphasis is on laboratory safety, correlation of experimental results and on written reports and oral presentation.
Prerequisite: 55–151B, 76–201B

55–261B Chemical Engineering Thermodynamics

Credits: 3 Hrs.: 3

Review of first and second law of thermodynamics. Concepts of phase and reaction equilibria, excess properties, fugacities, activity coefficients, and models of non–ideal solutions; thermodynamics applied to chemical processes.
Prerequisite: 55–231B, 55–151B

55–361B Computer Applications in Chemical Engineering

Credits: 3 Hrs.: 3

Numerical methods and applications to chemical engineering problems; Lagrange interpolation; integration; numerical solution of ordinary differential equations; boundary value problems, and systems of differential equations; introduction to numerical solutions of partial differential equations; emphasis on the use of spreadsheets, Matlab, and Mathcad.
Prerequisite: 55–251B, 60–151B

55–351B Equipment Operation and Safety

Credits: 3 Hrs.: 3

Main tasks of a chemical plant engineer: industrial application of major equipment; practical information on the working principles and engineering basis for major equipment, monitoring operating conditions and troubleshooting, following safety regulations and using safety gear, managing startups and shutdowns, equipment maintenance, dealing with chemical process equipment emergencies; special emphasis on safety aspects of operation.
Prerequisite: 55–221B, 55–251B

55–321B Chemical Reaction Engineering

Credits: 3 Hrs.: 3

Reaction equilibrium, reaction kinetics, interpretation of batch reactor data, ideal reactors, design for single and multiple reactions, isothermal and non–isothermal homogeneous reactions; introduction to heterogeneous catalysis
Prerequisite: 55–251B, 55–261B

55–331B Environmental Engineering

Credits: 3 Hrs.: 3

Fundamental principles in environmental engineering; chemical principles for separation, processing and technologies used for treating and recovery of wastes; qualitative and quantitative analysis and treatment of environmental problems; environmental legislations.
Prerequisite: 55–151B

55–381B Unit Operations

Credits: 3 Hrs.: 3

Fluid machinery, heat exchangers, condensers, evaporators; phase equilibria, binary and multi–components separations; equilibrium stage concept of process design for distillation and absorption
Prerequisite: 55–251B

55–302B Unit Operations Laboratory (2)

Credits: 2 Hrs.: 4

Intensive laboratory experiments illustrate the application of chemical and physical principles to chemical process; emphasis is given to mass transfer, simultaneous heat, mass transfer, and chemical kinetics.
Prerequisite: 55–252B

55–391B Process Dynamics and Control

Credits: 3 Hrs.: 3

Concepts of process control, including: dynamic modeling of processes, transfer functions, open loop response, feedback control, controllers and tuning methods, closed loop response, stability analysis, Measurement and instrumentation, frequency–domain.
Prerequisite: 55–321B

55–392B Process Dynamics and Control Laboratory

Credits: 1 Hrs.: 3

Applications of fundamental principles of the dynamics and control of chemical processes including open loop and closed–loop dynamics; controller tuning, computer control, and simulation of chemical processes.
Co–requisite: 55–391B

55–402B Equipment Sizing and Selection

Credits: 3 Hrs.: 3

Introduction to practical engineering methods for specifying or selecting type of equipment used in chemical industry such as; piping systems, control valves, pumps, compressors, heat exchangers, towers, mixers, reactors, storage tanks, etc.; materials of constructions; economics.
Prerequisite: 30–201B, 55–381B

55–451B Process Modeling, Simulation, and Optimization

Credits: 3 Hrs.: 3

Mathematical model formulation of chemical and physical processes; use of process simulators; optimization concepts; types of optimization problems and solution techniques.
Prerequisite: 55–391B, 55–361B

55–211B Material Science and Corrosion

Credits: 3 Hrs.: 3

Fundamentals; atomic structure, atomic arrangement, atomic imperfections, mechanical properties, processing and concept of engineering design of materials; electrochemical basis of corrosion, corrosion prevention by cathodic protection, inhibitors, alloying and heat treatment, passivation, stress corrosion cracking, corrosion fatigue.
Prerequisite: 55–151B

55–461B Quality Control

Credits: 3 Hrs.: 3

Principle, role, management, and history of quality control in chemical industry; concepts, techniques, and procedures of quality control; preparation of statistical control charts and selection of suitable sampling plans; fundamental concepts of reliability and experimental design; Laboratory experiments investigates the principles of quality control.
Prerequisite: 76–202B

55–463B Pharmaceutical Technology

Credits: 3 Hrs.: 3

Concepts necessary in the adaptation of engineering principles to pharmaceutical technology; Topics include: process engineering in drug manufacture such as mixing, drying and separation; basic pharmaceutical chemistry, formulations, production and design of drugs.
Prerequisite: 55–381B, 75–151C

55–467B Oil Upstream Operations

Credits: 3 Hrs.: 3

Fundamentals of oil and gas exploration and production; reservoirs; discovery; characterization of, and fluid flow through, porous media; principles of oil production performance, water flooding and enhanced oil recovery techniques.
Prerequisite: 55–381B

55–468B Biotechnology

Credits: 3 Hrs.: 3

Review of basic biological concepts such as cell construction, cell nutrient, and enzyme kinetics; large–scale production of enzymes; operation of bioreactors; recovery and purification of products; major biotechnology applications (in medicine, agriculture and environmental science, forensics).
Prerequisite: 55–321B, 55–381B

55–469B Special Topics in Chemical Engineering Technology

Credits: 3 Hrs.: 3

Topics of interest to chemical engineers not covered in regular courses; specific course description is made available prior to each offering; (May be repeated with change in topic for maximum credit of 3 semester hours).
Prerequisite: 55–402B

55–471B Project in Chemical Engineering Technology

Credits: 3 Hrs.: 3

Faculty supervised term projects or research assigned to individual student or groups on new or developing areas in chemical engineering; a written report and oral presentation are required.
Prerequisite: 30–201B, 55–401B

55–492B Advanced Process Control

Credits: 3 Hrs.: 3

State space methods; sampled data systems; discrete systems; multi–variable control; ratio and feed–forward control; closed loop analysis; control of complex chemical systems; design of controllers; advanced control techniques.
Prerequisite: 55–391B

55–403B Refining Processes

Credits: 3 Hrs.: 3

Crude oil properties; processes employed in petroleum refining operations; blending and other auxiliary processes; economics and optimization; environmental issues and regulations; laboratory experiments on crude oil characterization and major refinery units pilot plants, Laboratory experiments investigates the principles of petroleum refining.
Prerequisite: 55–381B

55–404B Refinery Products and Testing

Credits: 3 Hrs.: 4

Chemistry of petroleum products, sampling and labeling; ASTM specifications & evaluation of various types of petroleum products, blending; Laboratory experiment on various test methods, Laboratory experiments investigates the principles of petroleum products testing.
Prerequisite: 75–241B, 55–403B

55–407B Catalysis

Credits: 3 Hrs.: 3

Concepts in catalyst preparation, catalyst characterization, and kinetic analysis of catalytic processes; principles and factors affecting reaction rates; application to industrial catalytic processes
Prerequisite: 55–321B

55–411B Chemical Processes Technology

Credits: 3 Hrs.: 3

Material and energy balances for chemical processes; unit design and process evaluation; applications on local industries.
Prerequisite: 55–381B

55–415B Polymer Technology

Credits: 3 Hrs.: 3

Introduction to Polymer Science; chemistry of polymers; chemical and physical properties of synthetic polymers; polymerization reactions; manufacture of polymers and composite materials.
Prerequisite: 55–321B

55–413B Separation and mixing Processes

Credits: 3 Hrs.: 4

Fundamental principles and design of separation processes; batch and continuous flow; plate and packed towers; distillation, absorption, stripping, and extraction; fundamentals of mixing; operation, evaluation, and optimization; Laboratory experiments investigates the principles of separation and mixing processes.
Prerequisite: 55–381B, 75–241B

55–421B Water Desalination Technology

Credits: 3 Hrs.: 3

Properties of seawater; common methods of desalination; multiple stage flash desalination, vapor compression distillation, reverse osmosis, and electro–dialysis; pretreatment of sea water and post treatment of desalted water; introduction to industrial wastewater treatment.
Prerequisite: 55–381B

55–423B Wastewater Treatment

Credits: 3 Hrs.: 4

Introduction to wastewater treatment methods and technology, physical, chemical, and biological treatment; operation of equipment used in wastewater treatment; Laboratory experiments investigates the principles of wastewater treatment.
Prerequisite: 55–321B

55–441B Pollution Management and Control

Credits: 3 Hrs.: 3

Study of all pollution from industries, with emphasis on sources, cause, effects and general control methods; air pollution; air quality and emissions standards; plume and dispersion models; unit operations for control of gaseous and particulate pollutants; monitoring techniques.
Prerequisite: 55–321B, 75–241B

55–431B Hazard Recognition, Evaluation, and Control

Credits: 3 Hrs.: 3

Risk Management Programs; Screening Analysis Techniques; Checklist Reviews; Preliminary Hazard Analysis; Safety Audits; WHAT–IF Analysis; Failure Modes and Effects Analysis; Hazard and Operability Studies; Fault Tree and Event Tree Analysis; Specific Hazard Analyses; Quantified Risk Assessment; Human Reliability; Training; Emergency Preparedness; and Hazard controls.
Prerequisite: 55–351B

55–433B Industrial Hygiene and Ergonomics

Credits: 3 Hrs.: 3

Fundamentals of industrial hygiene and ergonomics; chemical hazards; Epidemiology; Toxicology; Physical hazards; Biohazards; The industrial hygiene survey; Injury & illness prevention programs; Ergonomics; Ergonomic risk factors; Ergonomic worksite programs.
Prerequisite: 55–431B

55–435B Safety Personnel Duties

Credits: 3 Hrs.: 3

Appraising plant safety and setting priorities, Inspection/Auditing, Incident/Accident investigation, Emergency response, Safety training program, and implementing safety regulations (Hazard communication, preventive maintenance programs, Injury/illness record keeping, Lockout / Tagout procedures, Cold / Hot work permits).
Prerequisite: 55–431B

Department of Civil Engineering Technology

Overview:

The Civil Engineering Technology curriculum prepares the graduates to work in coordination with civil engineers. It aims to provide the industry with assistant engineers capable of aiding engineers in executing and supervising civil engineering projects with the ability to continue their studies towards a higher degree.

Majors:

The department offers a set of courses through which the student may specialize in one of the following fields:

- Building Construction Technology
- Highways Engineering Technology
- Surveying Engineering Technology

Laboratories

Laboratories and workshops of the department of Civil Engineering Technology are equipped with testing machines, instruments, and tools including the following:

- Soil Mechanics and Foundation Laboratory
- Highway Testing Laboratory
- Concrete and Material Testing Laboratory
- Surveying Laboratory
- Sanitary Works Workshop

Department of Civil Engineering Technology

Major: Building Construction Technology

Code: 0431–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
54	151	Surveying	3	
57	161	Statics	3	
57	163	Structural and Architectural Drawings	3	64–103
57	164	Concrete and Construction Materials	3	
58	171	Soil Mechanics and Foundations	3	
58	172	Fluid Mechanics	3	
57	200	Field Training (1) *	2	
57	261	Theory of Structures	3	57–161
57	262	Strength of Materials	2	57–161
57	263	Quantity Surveying	3	57–200
57	264	Building Execution Drawings (1)	3	57–163
57	265	Reinforced Concrete (1)	3	57–261, 57–164
57	266	Building Services	3	
57	267	Steel Structures	3	57–261, 57–262
57	300	Field Training (2) **	4	57–200
57	361	Building Proper Execution	2	57–200, 57–266
57	362	Reinforced Concrete (2)	3	57–265
57	363	Computer Applications in Construction	2	57–163

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
54	153	Technical Reports	3	
57	166	Marine Structures	3	
54	251	Surveying Works	3	54–151
57	268	Contracts and Specification	3	57–263
58	272	Water and Sanitary Engineering	3	58–172
58	273	Highway Engineering	3	58–171
57	364	Building Execution Drawings (2)	3	57–264
57	365	Building Project	3	57–265
57	366	Construction Management	3	57–200

Department of Civil Engineering Technology

Major: Highways Engineering Technology

Code: 0432–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
54	151	Surveying	3	
57	161	Statics	3	
57	163	Structural and Architectural Drawings	3	64–103
57	164	Concrete and Construction Materials	3	
58	171	Soil Mechanics and Foundations	3	
58	172	Fluid Mechanics	3	
58	200	Field Training (1) *	2	
57	261	Theory of Structures	3	57–161
57	262	Strength of Materials	2	57–161
57	263	Quantity Surveying	3	
57	265	Reinforced Concrete (1)	3	57–164, 57–261
58	272	Water and Sanitary Engineering	3	58–172
58	273	Highway Engineering	3	58–171
58	274	Road Pavement	3	58–171
58	275	Road Safety	2	
58	276	Traffic Engineering	3	
58	300	Field Training (2) **	4	58–200
58	372	Quality Control for Roads	2	58–274
58	374	Road Construction Fundamentals	3	58–274

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
54	251	Surveying Works	3	54–151
57	362	Reinforced Concrete (2)	3	57–265
57	363	Computer Applications in Construction	2	57–163
58	371	Highway Design	3	58–273
58	373	Highway Project	3	57–261
58	375	Traffic Analysis	3	58–276

Department of Civil Engineering Technology

Major: Surveying Engineering Technology

Code: 0433–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
54	151	Surveying	3	
57	161	Statics	3	
57	163	Structural and Architectural Drawings	3	64–103
57	164	Concrete and Construction Materials	3	
58	171	Soil Mechanics and Foundations	3	
58	172	Fluid Mechanics	3	57–161
54	200	Field Training (1) *	2	
54	251	Surveying Works	3	54–151
54	252	Geodesy	3	54–251
54	257	Surveying Planning	2	54–251
54	258	Aerial Surveying	3	54–151
57	261	Theory of Structures	3	57–161
57	262	Strength of Materials	2	57–161
57	265	Reinforced Concrete (1)	3	57–261, 57–164
58	273	Highway Engineering	3	58–171
54	300	Field Training (2) **	4	54–200
54	351	Maps Projection and Drawings	2	54–251
54	352	Practical Surveying	3	54–251

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
54	153	Technical Reports	3	
57	166	Marine Structures	3	
57	263	Quantity Surveying	3	54–200
57	268	Contracts and Specifications	3	57–263
58	272	Water and Sanitary Engineering	3	58–172
54	353	Fund. of Global Positioning Systems	3	54–151
54	354	Geographic Information Systems	3	54–251
57	362	Reinforced Concrete (2)	3	57–265
57	366	Construction Management	3	54–200

COURSE DESCRIPTION

Department of Civil Engineering Technology

54–151 Surveying

Credits: 3 Hrs.: 5

Introduction: Surveying branches. Types of Maps and Scales. Distance by chaining or taping. Maps for small areas. Areas of lands and planimeter. Leveling: use of level and adjustment, and reasons for errors. Compass and azimuths. Theodolites: use and types

54–153 Technical Reports

Credits: 3 Hrs.: 4

Introduction, what is a report? Report topic, abstract, resources, main essay, analysis, results, and recommendations; construction: site technical reporting, maintenance report, time programming report, financial and cost reports, conclusion, and submission of final report.

54–200 Field Training (1)

Credits: 2 Hrs.: 8

Students are trained to use survey instruments in the field such as leveling instruments, theodolites, chains, and others. Inspect work site, water and electricity supply to the site, tools and building materials. Offices and other services. Using several types of maps and drawings.

54–251 Surveying Works

Credits: 3 Hrs.: 5

Angular measurements, theodolites uses and adjustments. Techeonietrv and its instruments. Traverses: Types and corrections. Topographic Drawing, contour maps, sextant, and fundamentals of hydrographic surveying. Fundamentals of Aerial surveying.
Prerequisite: 54–151

54–252 Geodesy

Credits: 3 Hrs.: 4

The geoids – Degrees of triangulation networks: specifications, shapes, observations, base lines, GPS. Adjustments of the net using: triangle equations, local, side equations. Height of observation towers, indivisibility, and types of errors. Standard deviation and probable errors. Strength of figures in the net.
Prerequisite: 54–251

54–257 Surveying Planning

Credits: 2 Hrs.: 4

Horizontal curves: types and elements. Alignments using one theodolite, two theodolites, and chain from tangent – chain from long chord. Vertical curves: types and calculations of reduced levels for all points on the vertical curve. Factors affecting partitions of lands. Partitions of triangles and polygons.
Prerequisite: 54–251

54–258 Aerial Surveying

Credits: 3 Hrs.: 4

Branches of aerial surveying: photogrammetry, photo interpretation, remote sensing, and GIS. Single vertical photograph. Stereoscopic vision. Measurements from Stereoscopic photo pairs. Flying maps: number of lines and photos. Ground control points and mosaics. Rectification. Fundamentals of Remote Sensing.
Prerequisite: 54–151

54–300 Field Training (2)

Credits: 4 Hrs.: 16

Using several types of maps, plans, drawings, and photographs. Participating under supervision in the execution of management process. Using different instruments such as levels, total stations, theodolites, tachometers, GPS, stereoscopes, and computers.
Prerequisite: 54–200

54–351 Map Projection and Drawings

Credits: 2 Hrs.: 6

Enlargement and decrement of maps. How to draw a contour line on leveling net? Drawing of maps. Cartography and reproduction, symbols, plotting coordinates, longitudes, latitudes, radial, equator, and central projections. Equal, UTM, KTM, and Conical Projections, Calculations of projections.
Prerequisite: 54–251

54–352 Practical Survey

Credits: 3 Hrs.: 5

Practice on site using surveying instruments such as levels, theodolites, tachometers, plane tables, plan meters, pantographs, stereoscopes, plan meters, compass, and sextant.
Prerequisite: 54–251

54–353 Fundamentals of Global Positioning Systems

Credits: 3 Hrs.: 4

History and institutional aspects of SATNAV. Coordinates reference systems. Satellites positioning (GPS, GLONASS, GALILEO). Satellite orbits: signals and messages. Propagation effects. Positioning, using Pseusoranges (stand alone, differential, carrier phase static and kinematic). GNSS applications markets. Satellite navigation. Software and hardware applications.
Prerequisite: 54–151

54–354 Geographic Information Systems

Credits: 3 Hrs.: 4

Introduction to cartographic principles and information. Topographic, thematic, remote mapping and GIS. Analysis skills Using ArcGIS. Basic computer literacy concepts. Software applications. Development of skills used to create, analyze, and display spatial in land and civil information system.
Prerequisite: 54–251

57–161 Statics

Credits: 3 Hrs.: 4

General Principles: mechanics, fundamental concepts, units of measurements, the international system of units, numerical calculation; force vectors: scalars and vectors, vector operations, equilibrium of a particle: condition for the equilibrium of a particle, the free body diagram, force systems, equilibrium of a rigid body; simple trusses: analysis of trusses, method of joints, method of sections, and center of gravity of mass.

57–163 Structural Drawings

Credits: 3 Hrs.: 6

Masonry, concrete, steel, timber and hydraulic structural detailing, sequence of site work and building techniques, building types, and architectural and electric detailing.
Prerequisite: 64–103

57–164 Concrete and Construction Materials

Credits: 3 Hrs.: 5

Aggregates: basic characteristics of aggregates, physical properties, types of aggregates (normal and manufactured); cement: manufacturing Portland cement, chemical composition of cement, properties of cement, types of Portland cement and their properties, other types of cement; introduction to concrete: materials, properties of fresh concrete, production of concrete, strength properties of hardened concrete. Metals, type of steel and their uses. Types of timber and their properties, defects in timber, durability and treatment of timber.

57–166 Marine Structures

Credits: 3 Hrs.: 4

Coastal engineering, development of near shore wave, currents and tides, harbor structure and facilities, classification of ports according to functions and location, two–dimensional linear wave theory and its application for the estimation of different wave characteristics (length, depth, and height), the effect of shoaling on waves, wind–generated waves, tsunamis, basin oscillations and storm surge, harbor planning and construction, types of breakwaters and factors determining their selection, piers, bulk heads, dolphins and moorings.

57–200 Field Training (1)

Credits: 2 Hrs.: 8

Inspecting work site, safety rules, site quality control, equating architecture with structure drawing plans, excavations, concreting, foundations, form work for reinforced, matching between reinforcement drawings and implementation, identifying the content of the checklist and verifying executable work with the checklist, forming work for ground beams, damp proofing from foundations to ground beams, back filling to the entire site, and submitting final report.

57–261 Theory of Structures

Credits: 3 Hrs.: 5

Equilibrium of rigid bodies (beams internal forces), analysis of statically determinate structures: relationship between external load, shear force and bending moment; shear and bending moment diagrams for beams and frames; deflection of beams, frames and trusses;, virtual work and influence lines.
Prerequisite: 57–161

57–262 Strength of Materials

Credits: 2 Hrs.: 3

Section properties. Stress and strain: units of stress, axial stress, axial strain, Poison's ratio, stress–strain relationship, isotropic and anisotropic materials, shear stress and shear strain, combined stresses, oblique planes and general two–dimensional stress system, principal planes and principal stress, and plastic stress and plastic strain. Temperature stress and strain, and strain energy.
Prerequisite: 57–161

57–263 Quantity Surveying

Credits: 3 Hrs.: 4

Specification, excavation and filling, plain concrete and reinforced concrete, masonry, metals, wood, finishes, bills of quantities and total estimation.
Prerequisite: 57–200

57–264 Building Execution Drawings (1)

Credits: 3 Hrs.: 5

Introduction, basic design elements, circulation areas, different functions of spaces, stairs, lifts, escalators and utility rooms, building materials, structural systems and technicality versus form, recognized legends in various drawings, data assigned to all drawings, match concept with architecture and structure, manual drawing of basic architecture, computer–aided drawing of basic architecture, project initial drawings, site plan, layout, block plans, mass plans and areas, plans for different floors, elevations and final presentation of the project.
Prerequisite: 57–163

57–265 Reinforced Concrete (1)

Credits: 3 Hrs.: 4

Design requirements, stress–strain curve for concrete, factor of safety, design of reinforced concrete beams, analysis of the balanced beams, analysis of rectangular beams, analysis of T beams, design of rectangular beam, design of T beams, specifying length of reinforced bars, design of reinforced concrete beams with compression reinforcement, development length and bond reinforcement, shear in beams, shear in non–reinforced concrete beams, shear in concrete beams with stirrups and deflections.
Prerequisite: 57–164, 57–261

57–266 Building Services

Credits: 3 Hrs.: 4

Firefighting, protection and safety, design and practice, thermal and water insulation materials and their properties, fundamental mechanism of heat transfer, air–conditioning system principles, equipment, types and applications in buildings, principle of elevators ‘Lifts’ and escalators, and applications in buildings.

57–267 Steel Structures

Credits: 3 Hrs.: 4

Advantages and disadvantages of steel as structural material; types of steel and their uses; mechanical and physical properties of steel; analysis and design of members subjected to different type of loads; connection: methods and types of connection, and design of footings of steel columns.
Prerequisite: 57–261, 57–262

57–268 Contracts and Specifications

Credits: 3 Hrs.: 4

Introduction to contracts and specification, competing parties, intact subject matter, consideration, agreements, types of bids, parties responsibilities, contract documents (I), tendering, contract documents (II), statutory conditions, contract documents (III), technical conditions, specifications, methods in contracts, laws and legislations for bidding, invitation form for bidding, construction materials specification, and standards of construction activities.
Prerequisite: 57–263

57–300 Field Training (2)

Credits:4 Hrs.:16

Ground floor water supply, sewage, columns form work, brick work, casting concrete and curing, electricity works conduits and other fixtures with concreting and masonry works, plastering and painting. damp proofing wet rooms, water supply fixtures. Sanitary work, down pipes, and testing sanitary and plumbing work. Finishing, heat insulation to external walls, AC ducts and equipment, electricity wiring and installations, mechanical works, interior decorations and false ceiling, flooring, roof finishing, and submission of final report.
Prerequisite: 57–200

57–361 Building Proper Execution

Credits: 2 Hrs.: 4

Gain the capability of supervising the project site work, accomplish the time and cost of planning in construction field, be a successful contractor, follow up the execution to the end, and deal with the check lists.
Prerequisite: 57–200, 57–266

57–362 Reinforced Concrete (2)

Credits: 3 Hrs.: 4

Floor and roof slabs: one–way slab, bending moment and shear for beams and one–way slabs, two–way slabs, design of two–way slabs according to ACI, joist construction (hollow joist slabs), design of short and long columns, foundations and their design: spread footings, combined footing, mat or raft footing, retaining wall and pre–stressed concrete design.
Prerequisite: 57–265

57–363 Computer Applications in Construction

Credits: 2 Hrs.: 4

Dimensional coordination; bricks: dimensions and specifications, tile flooring: granite, marble and ceramic finishing in modular practice; doors and windows: Kuwait products and standardization, doors and windows; different architectural fixtures and modular coordination, precast construction and dimensional coordination, dimensional coordination and building economy, and using computers in designing and preparing drafts by coordination.
Prerequisite: 57–163

57–364 Building Execution Drawings (2)

Credits: 3 Hrs.: 5

Project topic: multistory building with basement, establishing modular system for the project structural system (interpretation), establishing the site plotting plans, foundations, columns and ground beam plans, typical section for the under earth structure from the excavation level, manual practice and using computers; drawing: electricity layout, sanitary layout, AC layout, roof plan and rain water drainage, elevations, and sectional elevations.
Prerequisite: 57–264

57–365 Building Project

Credits: 3 Hrs.: 6

Excavation and leveling works, planning of site works, concreting and curing, masonry, sanitary and plumbing works, electric mechanical installations, plastering and painting, false ceiling and interior decorations, doors and windows, carpentry and joinery, damp proofing and heat insulation, miniature representation and final presentation systems, hot water supply systems, service ducts, drainage, fire protections, design and installation of wet risers, dry risers and sprinklers, mechanical services, lifts and escalators.
Prerequisite: 57–265

57–366 Construction Management

Credits: 3 Hrs.: 4

Process of management: operating level, coordinating level, strategic level. management system approaches: organization structure, hierarchical pattern, classical organization theory, bureaucracy and routine theory; project management system: quality control, finishing control, cost control, time control, planning for the project: bar chart, scheduling, critical path method (CPM), program evaluation and review technique (PERT), resource aggregation, resource allocation, and the cost and income budgets for a contract.
Prerequisite: 57–200

58–171 Soil Mechanics and Foundations

Credits: 3 Hrs.: 5

Nature and characteristics of soils, soil classification, soil compaction, shear strength, effective stresses, consolidation, stress distribution and settlement of structures, types of foundations and their bearing capacity on soils, site investigation and characterization.

58–172 Fluid Mechanics

Credits: 3 Hrs.: 4

Properties of fluids: units, mass density and specific weight, fluid static; fluid flow concepts and measurements: kinematics of fluids, steady and unsteady flows, separation and capitation in fluid flow, flow measurement through pipes, flow of incompressible fluids in pipes, resistance in circular pipelines flowing full, resistance of flow in non-circular sections, local loses, pipe network analysis, hydraulic structures, spillways, energy dissipaters and downstream.

58–200 Field Training (1)

Credits: 2 Hrs.: 8

Students are trained to know the field work in road construction. They attend construction field tests of the base and sub–base courses, and the different surface coating materials used in Kuwait.

58–272 Water and Sanitary Engineering

Credits: 3 Hrs.: 5

Quantity of water and sewage, population forecasting, factors affecting consumption, rainfall and runoff, hydrology, transpiration, ground water, occurrence of aquifer, water and waste water quality, examination of water and sewage, water treatment, removal of dissolved minerals from water, ion exchange, membrane processes, control of corrosiveness, odors, ion exchange, wastewater treatment, primary treatment, secondary treatment, the activated sludge process, and advanced waste treatment.
Prerequisite: 58–172

58–273 Highway Engineering

Credits: 3 Hrs.: 4

Selecting route path, cross section (right of way), contributing factors, decision making, road types and shoulders, vehicle types, traffic volumes, design speed, maximum grades, safety, horizontal alignment, general guidelines, curve length, super elevation, vertical alignment, critical grad lengths, vertical curve lengths, sight distance, junctions, layout types, selection factors (capacity), speed change lanes, grade separated junctions, signs and signposts, and road markings.
Prerequisite: 58–171

58–274 Road Pavement

Credits: 3 Hrs.: 4

Pavement layers, pavement life, traffic damage estimation, soil classifications and characteristics, aggregate, bitumen, Portland cement, lime, prime coat, tack coat, soil stabilization and compaction, stability tests, treating road bases, graded mixture, treating with bitumen, treating with cement, treating with lime, treating with CaCl or NaCl, surface, flexible, rigid, thickness design, asphalt mix design (super pave design), and concrete mixture.
Prerequisite: 58–171

58–275 Road Safety

Credits: 2 Hrs.: 3

Accident distributions, accident trends and patterns, road surface, centrifugal force, stopping sight distance, passing sight distance, street illumination, vehicle lights, signs and marks, side clearances, road works, signs, signals and lights, cones and barriers, temporary through traffic, accident causes and factors, society, environment, vehicle, human error, road layout, road furniture, black sites, intersection exposure function, road user activity (links and junctions), remedial measures, change the situation, traffic calming, and reducing conflict points.

58–276 Traffic Engineering

Credits: 3 Hrs.: 4

Traffic activity and types, field situation, future needs and requirements, planning, study area and zoning, trip studies, road users, future trips, proposals, traffic densities, speed flow determination, pedestrians, junction types, delays at priority intersections, weaving action, capacity, queuing process, congestion origination, restraint, back wave, emergency vehicles, pollutions, signalized intersections, signal cycle, phasing, capacity, effective green, conflict points, ultimate capacity, delays and optimum setting, average queue length.

58–300 Field Training (2)

Credits: 4 Hrs.: 16

Students participate under supervision in field jobs, while the execution of roads takes place. Material mixing, field tests, and machinery used are parts of this training program. Reports are required as work progress.
Prerequisite: 58–200

58–371 Highway Design

Credits: 3 Hrs.: 4

General, existing network, new scheme, elements of design, requirements, links, junctions, sidewalks, utility spots, service areas, safety objects and facilities, center line, road division, surveying, general information, tools, GPS, mapping and contours, surveying software, rural road design flows, urban road design flows, comments, project application, case and situation, steps, surveys, data transfer, and design.
Prerequisite: 58–273

58–372 Quality Control for Roads

Credits: 2 Hrs.: 3

Materials and standards, road construction phases, site investigation, material quality and quantity, aggregates, bitumen, granular soil, fine soil, fillings, curbstone, soil tests, relative compaction (%), field density, swelling factor (speedy), asphalt, asphalt cement, liquid asphalt, asphalt mix, layer check, sub grade, base layer, asphalt surface, and concrete surface.
Prerequisite: 58–274

58–373 Highway Project

Credits: 3 Hrs.: 4

Introduction to general road and traffic problems. Case study and introduction, problem requirement, type of data for study, study format, computer software, data collection, data retrieval, data analysis, results and presentation, and proper solutions.
Prerequisite: 57–261

58–374 Road Construction Fundamentals

Credits: 3 Hrs.: 4

Basic illustration of the procedures in building road layers for both flexible and rigid pavements. This includes the steps and phases of constructing each layer, service lines and utility networks, equipments needed, and field tests.
Prerequisite: 58–274

58–375 Traffic Analysis

Credits: 3 Hrs.: 4

General, analysis justification, problems and requirements, trip generations, traffic classifications, public transport, freight, parking, data manipulation, collection approaches, traffic counts, speed and flow surveys, pedestrian surveys, public transport surveys, freight surveys, data retrieval, data analysis, geographic information system, selecting junction types, traffic activity, time and seasonality, forecasting, proper solutions, and cost/benefit analysis.
Prerequisite: 58–276

Department of Electrical Engineering Technology

Overview:

The department of Electrical Engineering Technology aims at graduating the skillful, well–trained technicians needed by the State of Kuwait in the field of electrical machines and the transmission and distribution of electrical energy. This is achieved by teaching the students the basic knowledge and technical skills in their majors. Students also acquire the ability to follow the fast progress in Electrical Engineering Technology and continuing the academic studying in both theoretical and practical aspects of their majors.

Majors:

The department awards a Diploma degree in two majors:

- Electrical Machinery Engineering Technology
- Electrical Energy Transmission and Distribution Engineering Technology

The course curriculums of the two majors are carefully designed to provide students with an adequate theoretical background as well as acquainting them with practical skills required by the labor market through a number of modem laboratories and workshops equipped with modem tools, machines and measuring instruments. This provides a low density of students on the equipment, which will reflect on the great benefit of students to acquire different practical skills.

Laboratories:

In order to satisfy previously mentioned objectives, the department has established a large number of laboratories and workshops as follows:

- Electric power simulation laboratory
- High–voltage laboratory
- Two laboratories of small machines and transformers
- Laboratory of big electrical machines and their control, and fault detection
- Two wiring and installation laboratories
- Electrical instruments and measurements laboratory
- Electrical circuits laboratory
- Power electronics laboratory
- Installation workshop
- Maintenance of transformers workshop
- Electrical cables and circuit breakers workshop.
- Assembling and rewinding of DC electrical machines workshop
- Assembling and rewinding of AC electrical machines workshop
- Control of electrical machines workshop

Department of Electrical Engineering Technology

Major: Electrical Machinery Technology

Code: 0411–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
70	110	Electrical Engineering Fundamentals	3	
70	115	Electrical Circuits	3	70–110
52	125	DC and Synchronous Machines	3	
52	126	DC and Synchronous Machines Training	3	
70	147	Power and Installations Workshop	3	
52	200	Field Training (1) *	2	52–126
52	220	Transformers	3	
52	235	Induction Machines	3	
52	236	Induction Machines Laboratory	1	
70	259	Power Systems and Protection	3	
52	260	Power Electronics	3	70–110
52	270	Electrical Drives	3	52–260
70	283	Computer Applications	2	69–182
52	285	Electrical Machines Control	3	52–125
52	330	Programmable Logic Controllers	3	
52	337	Electrical Machines Maintenance	3	52–235
52	340	Fractional HP Machines	3	52–125
52	300	Field Training (2) **	4	52–200

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
70	215	Advanced Electrical Circuits	2	70–115
52	231	Electrical Measurements	2	70–110
70	245	Electrical Installations (1)	3	70–147
52	250	Automatic Control	3	52–125
52	258	Logic and Digital Circuits	3	
70	258	Power System Operation	3	70–259
52	284	Advanced Computer Applications	2	70–283
70	292	Electrical Calculations	3	76–105
52	296	Project	2	52–125

Department of Electrical Engineering Technology

Major: Electrical Energy Transmission and Distribution Technology

Code: 0412–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
70	110	Electrical Engineering Fundamentals	3	
70	115	Electrical Circuits	3	70–110
52	123	Electrical Machines (1)	3	70–110
70	161	Fundamentals of Electrical Power	3	
52	175	Elec. Machines and Install. Workshop	3	
70	200	Field Training (1) *	2	52–175
52	227	Electrical Machines (2)	3	52–123
70	245	Electrical Installations (1)	3	
70	262	Transmission of Electrical Power	3	70–115
70	263	Distribution of Electrical Power	3	70–115
70	264	Power Cables Workshop	1	
70	265	Operation and Control of Power systems	3	70–262
70	266	Electrical Substations	3	70–161
70	283	Computer Applications	2	69–182
70	300	Field Training (2) **	4	70–200
70	345	Electrical Installations (2)	3	70–245
70	362	Protection of Power Systems	3	70–161
70	363	High Voltage Engineering	3	70–161

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
70	215	Advanced Electrical Circuits	2	70–115
52	231	Electrical Measurements	2	70–110
52	260	Power Electronics	3	70–110
70	285	Advanced Computer Applications	2	69–182
70	292	Electrical Calculations	3	76–105
70	299	Projects	2	70–262
70	335	Electrical Maintenance	2	70–266
52	340	Fractional HP Machines	3	52–123
70	365	Electrical Power Stations	2	70–161
70	374	Power Systems Analysis	3	70–262

COURSE DESCRIPTION

Department of Electrical Engineering Technology

52–123 Electrical Machines (1)

Credits: 3 Hrs.: 4

Magnetic fields and relationships, and magnetic circuits. Principles of DC machines; generators and motors: construction; equivalent circuit; performance characteristics; applications, parallel operation, starting and speed control of dc motors. Transformer theory; types, construction, equivalent circuit, and performance.
Prerequisite: 70–110

52–125 DC and Synchronous Machines

Credits: 3 Hrs.: 3

The first part of this course describes the basic principles and construction of dc machines; types, armature winding, and EMF equation. A comprehensive study of dc generators and motors includes; types, equivalent circuit, analysis, load characteristics, applications, voltage and speed regulation, power flow, torque, efficiency, and starting techniques. The second part describes the basic principle and construction of synchronous machines; types, speed and frequency, armature winding, EMF equation, distribution factor, pitch factor, and flux density harmonics. A comprehensive study of synchronous generators and motors includes; equivalent circuit, phasor diagrams, voltage regulation (synch. generators), speed regulation (synch. motors), power flow, torque, efficiency, and graphical representation using electrical load diagram. Parallel operation of synchronous generators and power factor correction using synchronous motors are also given.

52–126 DC and Synchronous Machines Training

Credits: 3 Hrs.: 7

The first part of this course provides the laboratory experimental setup of different types of dc generators and motors, and synchronous generators and motors. The second part of the course is a workshop dealing with assembling and disassemble of the dc machine and synchronous machine, rewinding the armature, testing and maintenance.

52–175 Electrical Machines and Installations Workshop

Credits: 3 Hrs.: 7

Testing, assembling and disassembling of power transformers. Inspection, testing, and maintenance of DC generators and motors for possible defects and faults. Electrical installation regulations and inspection in buildings. Current carrying capacities of cables and wires. Fire fighting alarm systems.

52–200 Field Training (1)

Credits: 2 Hrs.: 8

In this training course the student is introduced to the practical and industrial parts of electrical engineering. The student is trained in at least one location and participates in the activities performed by the staff in the location. This “hands on” experience is essential for the student to gain an experience about the areas where electrical engineering is being applied.
Prerequisite: 52–126

52–220 Transformers

Credits: 3 Hrs.: 4

Covering, both theoretical and practical aspects of electric transformers. Transformers classifications, construction, methods of cooling (liquid–type and dry–type), and connections are all discussed. Special purpose transformers, e.g. induction furnace transformers, autotransformers and rectifier transformers are also introduced. The theory of operation, protection and transformers testing are also outlined.

52–227 Electrical Machines (2)

Credits: 3 Hrs.: 4

Synchronous generators, Synchronous motors, and Induction motors: types, construction, equivalent circuit, vector diagrams, parallel operation, voltage regulation, power–torque relationship, V curves, slip, torque speed characteristics, methods of starting, speed control, NEMA classes, losses and efficiency.
Prerequisite: 52–123

52–231 Electrical Measurements

Credits: 2 Hrs.: 3

This course describes the principles of analog electrical instruments and errors in measurements. The course classifies the electrical instruments and their functions based on the instrument's structure: d'Arsonval meter movement, Moving iron movement, Electrodynamometer movement, and induction. The course covers a wide range of electrical instruments: ammeters, voltmeters, ohmmeters, multi–meters, single–phase watt–hour meter, Wheatstone and Kelvin Bridges, and the meager.
Prerequisite: 70–110

52–235 Induction Machines

Credits: 3 Hrs.: 3

Basic principle and construction of three–phase induction motors; types, speed slip. A comprehensive study of three–phase induction motor includes equivalent circuit, analysis, power flow, efficiency, developed torque, maximum torque, maximum power, and maximum efficiency. Determination of motor parameters, speed control, and starting techniques are also included. Standard classes of three–phase induction motors and their characteristics and applications are also mentioned. A comprehensive study of single–phase induction motor includes types, construction, equivalent circuit, analysis, power flow, torque, efficiency, starting techniques, and applications. A brief study of two–phase induction motor is also noted and includes operation and applications.

52–236 Induction Machines Laboratory

Credits: 1 Hrs.: 2

Laboratory experimental setup of different types of three–phase, and single–phase induction motors. The experiments focus on determining both the parameters and the performance characteristics of three–phase, and single–phase induction motors.

52–250 Automatic Control

Credits: 3 Hrs.: 4

Control systems; open– and closed–loop, continuous and discontinuous systems, feed–back, block diagrams, transfer function, and servomechanism. Effect of feed–back on gain, gain stability, input resistance, output resistance, distortion, and stability. Control motors; D.C, two–phase, and tacho–generators. Time response of first and second order systems. Transducers and error detectors. System response to different inputs using Laplace transform. Applications; frequency control of power system voltage control, speed control of D.C motors, and position control.
Prerequisite: 52–125

52–258 Logic and Digital Circuits

Credits: 3 Hrs.: 4

This course is intended to introduce the student to the basic concepts and devices used in digital electronics. The students learn about the binary number system and how to convert between systems. The course introduces the principles in Boolean algebra and the design of combinational and sequential circuits with implementation at logic circuit level. The course covers the basic digital circuits, such as gates, inverters, multi–vibrators, and other logic circuits. These circuits are analyzed in the laboratory.

52–260 Power Electronics

Credits: 3 Hrs.: 4

This course describes the principle of power electronics, its switching nature, the characteristics of different switching devices such as power diode, bipolar junction transistor, and thyristor. It also contains the basic types of converter topologies such as ac–dc rectifiers, dc–dc choppers, dc–ac inverters, and ac–ac voltage controllers. The study of these converters includes circuit topology, circuit waveforms, principle of operation, performance parameters, methods of control, and applications.
Prerequisite: 70–110

52–270 Electrical Drives

Credits: 3 Hrs.: 4

This course describes the principle of electrical drive systems, their types, elements, characteristics, performance parameters, and applications. Single–phase dc drive systems – Three–phase dc drive – Three–phase induction motors drive systems. DC chopper drive systems – Braking system; dynamic braking, and regenerative braking. Introduction to UPS systems; types, characteristics, performance parameters, specifications, and applications. High frequency link UPS systems – Static bypass – Monitoring parameters. Batteries; types, characteristics, specifications, troubleshooting, and applications. Battery chargers; types and performance.
Prerequisite: 52–260

52–284 Advanced Computer Applications

Credits: 2 Hrs.: 4

Usage of computer software packages in solving different problems in electrical circuits, electrical machines, power electronics, automatic control, and machine drives. PSpice and MATLAB packages are being adopted throughout the course applications.
Prerequisite: 70–283

52–285 Electrical Machines Control

Credits: 3 Hrs.: 5

The first part describes the basic principles of electrical control circuits; types and components, starting, speed control, reversing and breaking control techniques, automatic voltage regulator. The second part provides students with opportunity of designing, wiring, checking, and troubleshooting some electro–mechanical control systems.
Prerequisite: 52–125

52–296 Project

Credits: 2 Hrs.: 4

The Project may be implemented in any of the major fields: Power circuits, Power system protection, Installation, etc. the output of the project may be a novel circuit or it may be a reproduce of any electric device with available components in the market. Selection of an appropriate engineering technology project for design and development. The majority of this work is spent in the laboratory researching, designing, proto typing, debugging and fabricating the project. The course requirement includes oral and written report on the project.
Prerequisite: 52–125

52–300 Field Training (2)

Credits: 4 Hrs.: 16

In this second field training, which is usually taken in the final semester, the students receive an intensive training in two or three industrial locations. Typical training locations are power generation stations, central workshops and pumping stations. In addition to learning the operation of many electrical equipment, the student gains a good practical experience in these fields and performs trouble shooting and testing for various electrical equipment.
Prerequisite: 52–200

52–330 Programmable Logic Controller

Credits: 3 Hrs.: 4

This course presents the basic concepts of automation engineering by programmable logic controllers and its applications in electrical machines. Number systems, basic logic circuits, construction of PLC, timers, registers, counters, ladder diagram, statement list and induction motor control by PLC will be presented.

52–337 Electrical Machines Maintenance

Credits: 3 Hrs.: 7

This course presents the hazards of electric shocks on human life and precautions that should be considered in dealing with electricity. The importance and the benefits of maintenance and establishment of a planned maintenance program. Plant equipment inventory and record keeping. Typical machine condition monitoring techniques. Planned maintenance and preventive maintenance procedures for typical plant equipment. Breakdown maintenance charts for electrical components. Case studies, software and hardware for planned maintenance programs. The second part covers the transformer workshop tasks as implemented by an electrical technician. Transformer maintenance; preventive maintenance, repair for troubleshooting, inspection of external parts and testing of transformer oil. The third part covers the construction, disassembling and assembling of single and three phase induction motors, training on different techniques of rewinding the motor. Forward and reverse operation, and the motor maintenance.
Prerequisite: 52–235

52–340 Fractional HP Machines

Credits: 3 Hrs.: 4

A brief classification of special electric machines. Various types of special purpose electric machines including universal motor, permanent magnet motor, reluctance motor, brushless DC motor, stepper motors, linear induction motor and hysteresis motor are presented. The construction, operation, characteristics, and applications of each machine are described.
Prerequisite: 52–125

70–110 Electrical Engineering Fundamentals

Credits: 3 Hrs.: 4

The course starts with introduction on units of measurements, system of units, powers of ten, prefix and abbreviation. The course also introduces the basic quantities and elements of electric circuits such as voltage, current, resistance, power, energy, and efficiency. Methods for calculating the DC resistance of conductors are discussed. Basic laws and theorems in electrical engineering such as finding an equivalent resistance of a network, Ohm’s law, Kirchhoff’s voltage and current laws (KVL and KCL) are discussed. The principle of alternating current and methods of calculating basic quantities of alternating waveforms, phasors and AC electric circuits are described. Finally, methods for calculating quantities and elements of magnetic circuits are described.

70–115 Electrical Circuits

Credits: 3 Hrs.: 4

This course starts with presentation of source conversion. The chapters thereafter focus on the fundamental theorems of DC electrical network such as mesh analysis, nodal analysis, superposition, The venin's and Norton's theorems, maximum power transfer and finally Millman's theorem. The same theorems are repeated for AC electrical networks. Finally, methods for analyzing and calculating electrical quantities of balanced three–phase systems will be discussed.
Prerequisite: 70–110

70–147 Power and Installations Workshop

Credits: 3 Hrs.: 7

Types of wiring used in buildings, Regulations, safety precautions, earthing, simple design of lighting system, load calculations, protective devices. Technical skills related to cables their construction, different types of joints for both HV & LV cables, circuit breakers disassemble, assemble, inspection and maintenance. Implementation of simple control circuits of protection systems.

70–161 Fundamentals of Electrical Power

Credits: 3 Hrs.: 4

General structure of power systems with a special emphasis on how different components of a power system interact and affect each other. Load characteristics and different methods of tariffs' calculation. Batteries and UPS, from the viewpoint of their industrial applications, testing, and maintenance.

70–200 Field Training (1)

Credits: 2 Hrs.: 8

Practical training for a period of 7 weeks (175 hours) in generation, transmission, and distribution of electrical power facilities in Kuwait. Students practice manufacturing and assembly of electrical circuits and equipment. Students receive adequate training on the basic skills needed for working in the field of power systems and write technical reports about working in different electrical power systems environments.
Prerequisite: 52–175

70–215 Advanced Electrical Circuits

Credits: 2 Hrs.: 3

Balanced and unbalanced three–phase circuits. Voltage, current and power calculations in three phase circuits. Transients in RL, RC and RLC circuits. Fourier series analysis, RMS and harmonic calculations for non–sinusoidal periodic waveform. Characteristics of simple electronic devices (Diodes, Transistors and Operational Amplifiers). Simple electronic circuits and their applications. Two–port circuit analysis.
Prerequisite: 70–115

70–245 Electrical Installation (1)

Credits: 3 Hrs.: 5

This course covers methods of wiring used in buildings. The course will also enable the student to read and understand wiring diagrams in order to implement and troubleshoot electrical circuits. The student will also be introduced to regulations, safety precautions, electrical wiring symbols, earthing, simple design of electrical distribution and lighting system, load calculations, and protective devices. Upon the completion of this course, the student should be able to install a complete wiring system including conduits, wires, meters, main and sub–main distribution boards, fuses, sockets, light fittings, and other devices used in building installations. The course also covers methods of measuring earth resistance and insulation resistance.
Prerequisite: 70–147

70–258 Power System Operation

Credits: 3 Hrs.: 4

This course covers topics related to modern operation of electric power systems. A general background of the power system structure and operation aspects is first introduced. The performance of transmission system is discussed, followed by the formulation and solution of the basic load flow problem. Economic load dispatching and unit commitment of thermal power units is also covered. Theory of reactive power compensation and frequency control aspects is presented.
Prerequisite: 70–259

70–259 Power Systems and Protection

Credits: 3 Hrs.: 3

This course introduces, at first, a brief introduction to the power system structure. The various types of generating plants as well as the overhead transmission system components and parameters are presented. The course introduces symmetrical short circuit current calculations. The basic idea of power system protection and the main components of the protection system such as relays, circuit breakers are presented in detail. Protection schemes such as over current, earth leakage and differential protections are also introduced. The course covers the protection of generators and motors in details.

70–262 Transmission of Electrical Power

Credits: 3 Hrs.: 4

Transmission line parameters and performance under different loading conditions. Concepts and basic equations of load flow problem, (using Gauss–Seidel interactive technique). Types of faults and methods of calculating symmetrical and unsymmetrical short circuit currents in power systems. Safety principles, including earthing of different OHTL components.
Prerequisite: 70–115

70–263 Distribution of Electrical Power

Credits: 3 Hrs.: 4

Load characteristics for electric distribution systems, Primary and secondary distribution schemes, voltage regulation, and economics of distribution systems. Distribution substations and their connections. Coverage of distribution transformers and street lighting. Maintaining and testing of earthing methods and safety principles.
Prerequisite: 70–115

70–264 Power Cables Workshop

Credits: 1 Hrs.: 3

Construction, performance, and cooling systems of underground cables. Cable parameters calculation: insulation resistance, capacitance, effective resistance, and cable ampacity. Electrical and thermal characteristics. Methods of laying cables. Fault location and troubleshooting. Cable joints and terminations. Cables' earthing and safety principles.

70–265 Operation and Control of Power Systems

Credits: 3 Hrs.: 4

Steady state power flow, economic load distribution between units and plants. Some basic control concepts of power systems, such as frequency control and reactive power control. Power systems stability.
Prerequisite: 70–262

70–266 Electrical Substations

Credits: 3 Hrs.: 7

Substation functions, structures, and types. Main components of substations and the substation earthing systems. Substation layout and bus bar schemes. Insulators, surge arresters, and protection systems in substations. Project planning and use of computers for coordination, control, and monitoring in substations.
Prerequisite: 70–161

70–283 Computer Applications

Credits: 2 Hrs.: 4

An introduction to the widely used software in electrical engineering technology: Computing systems using spreadsheets (numerical integration for the calculation of average and root–mean square of given signals, complex analysis, matrix manipulation, solving circuit equations under sinusoidal steady state conditions); Basic circuit simulation methods and solutions using PSPICE (Orcad) network analysis software; and Introduction to Mathcad for engineering: calculations, analysis, and graphing.
Prerequisite: 69–182

70–285 Advanced Computer Applications

Credits: 2 Hrs.: 4

Implementation of computer software in solving different problems in electrical engineering. MATLAB is being adopted throughout the course applications. The applications cover electrical circuit analysis, power system analysis, and electrical machines analysis.
Prerequisite: 69–182

70–292 Electrical Calculations

Credits: 3 Hrs.: 4

Matrix Algebra, Rational Functions, Partial fractions, Simple Laplace transform and its inverse. Differential Equations solution using Laplace transforms. DC and AC response of an R L C circuits, activating inductor, charging capacitor, analysis of non–sinusoidal waveform, harmonic spectrum analysis, Opening and closing circuit breakers in power systems.
Prerequisite: 76–105

70–299 Projects

Credits: 2 Hrs.: 4

Implementation in any of the major department fields: Power circuits, power electronics, electronic circuits, installations, etc. The output of the project may be a novel circuit or it may be a reproduce of any electric device with available components in the market.
Prerequisite: 70–262

70–300 Field Training (2)

Credits: 4 Hrs.: 16

Practical training for a period of 15 weeks (300 hours) in generation, transmission, and distribution of power facilities in Kuwait. Emphasis is laid on operation, maintenance, and control of technical systems, equipment setup, commissioning, calibration (or installation), and safety and environment.
Prerequisite: 70–200

70–335 Electrical Maintenance

Credits: 2 Hrs.: 2

Importance and benefits of electrical maintenance. Hazards of electric shocks and precautions. Establishment of a planned maintenance program. Selected tasks such as plant equipment inventory and record keeping. Planned maintenance and preventive maintenance. Breakdown maintenance. Applications and case studies.
Prerequisite: 70–266

70–345 Electrical Installations (2)

Credits: 3 Hrs.: 4

Electrical installation layouts for different buildings. Load calculations and conductor size selections. Selection of main distribution panels, distribution boards, and different components such as MCCB, MCB, and RCCB. Different methods for testing electric circuits. Illumination layouts with proper size of lamps.
Prerequisite: 70–245

70–362 Protection of Power Systems

Credits: 3 Hrs.: 4

Concept of protection in power systems. The main components of protection system: circuit breakers and relays. Protection schemes such as over–current, directional, differential, and distance protections. Protection of different power system components: generators, motors, transformers, busbars, and transmission lines. Testing and maintenance of protective relays.
Prerequisite: 70–161

70–363 High Voltage Engineering

Credits: 3 Hrs.: 4

Main components of high–voltage OHTL. Power transformers: theory, types, performance, connection to network, maintenance, and testing. Safety principles and precautions. Generation of HV (AC, DC, and impulse) and their applications. HV measuring methods and devices. Theory of breakdown and discharge phenomena in solids, liquids, and gases.
Prerequisite: 70–161

70–365 Electrical Power Stations

Credits: 2 Hrs.: 2

Types and features of Electrical Power Stations. Construction of thermal electrical power stations. Components of electrical power stations. Operation and maintenance of electrical power stations. Control of voltage, frequency and power flow in electrical power stations. Renewable energy sources.
Prerequisite: 70–161

70–374 Power Systems Analysis

Credits: 3 Hrs.: 4

Power system analysis problems and their possible solution techniques. Calculating network transmission losses and solution techniques of the load flow problem. Economic dispatch of thermal units. Power system stability.
Prerequisite: 70–262

Department of Electronic Engineering Technology

Overview:

The Department of Electronic Engineering Technology aims to provide students with technological skills required to seek employment as assistant engineers in four diverse fields of electronic engineering technology and furnish clear and comprehensive education in each field of specialization. The department continuously updates its laboratories and workshops with modern requirements in constructing a technician career.

Majors:

The Electronic Engineering Department introduces four fields of specializations in electronic technology. These are as follows:

- Communications Engineering Technology
- Control Systems Engineering Technology
- Biomedical Electronics Engineering Technology
- Computer Engineering Technology

Laboratories:

The department has the following laboratories and workshops in addition to personal computer laboratories:

- Electronic Circuits Laboratory
- Components and Electronic Devices Laboratory
- Digital Electronics Laboratory
- Microprocessor Laboratory
- Industrial Electronics Laboratory
- Biomedical Equipment Laboratory
- Communications Laboratory
- Biomedical Equipment workshop
- Industrial Electronics Workshop
- Communications Workshop

Department of Electronic Engineering Technology

Major: Communications Engineering Technology

Code: 0421–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
53	104	Electronic Drafting and Workshop	3	
53	131	Electrical Circuits (1)	3	
53	132	Electrical Circuits (2)	3	53–131
53	133	Digital Circuits (1)	3	
53	134	Electronics (1)	3	53–131
53	138	Electronic Measurements	3	
53	163	Analog Communications	3	53–134
53	200	Field Training (1) *	2	
53	205	Troubleshooting and Maintenance	3	53–104, 53–134
53	235	Digital Circuits (2)	3	53–133, 53–134
53	236	Electronics (2)	3	53–134
53	237	Microprocessor Fundamentals	3	53–235
53	255	Electromagnetic applications	3	53–132
53	264	Digital Communications	3	53–163
53	300	Field Training (2) **	4	53–200
53	306	Electronic Project	3	53–205
53	365	Communication Electronics	3	53–163

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
53	356	Microwave Communications	3	53–255
53	357	Antenna Theory	3	53–255
53	358	Optical Communications	3	53–163
53	366	Selected Topics in Communication Eng.	3	53–163
53	367	Digital Communication Networks	3	53–264
53	368	Modern TV Techniques	3	53–163

Department of Electronic Engineering Technology

Major: Control Systems Engineering Technology

Code: 0422–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
53	104	Electronic Drafting and Workshop	3	
53	131	Electrical Circuits (1)	3	
53	132	Electrical Circuits (2)	3	53–131
53	133	Digital Circuits (1)	3	
53	134	Electronics (1)	3	53–131
53	138	Electronic Measurements	3	
69	200	Field Training (1) *	2	
53	205	Troubleshooting and Maintenance	3	53–104, 53–134
53	235	Digital Circuits (2)	3	53–133, 53–134
53	236	Electronics (2)	3	53–134
53	237	Microprocessor Fundamentals	3	53–235
69	270	Industrial Electronics	3	69–273
69	273	Automatic Control	3	53–134
69	300	Field Training (2) **	4	69–200
69	306	Electronic Project	3	53–205
69	371	Industrial Instrumentation	3	53–138
69	372	Programmable Logic Controllers	3	53–235

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
52	230	Electrical Machines	3	53–132
69	374	Computer–Based Control	3	69–273
69	375	Microprocessor Applications	3	53–237
69	376	Robotics	3	69–273

Department of Electronic Engineering Technology

Major: Biomedical Electronics Engineering Technology

Code: 0423–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
53	104	Electronic Drafting and Workshop	3	
53	131	Electrical Circuits (1)	3	
53	132	Electrical Circuits (2)	3	53–131
53	133	Digital Circuits (1)	3	
53	134	Electronics (1)	3	53–131
53	138	Electronic Measurements	3	
68	190	Biomedical Principles	3	
68	200	Field Training (1) *	2	53–131, 68–190
53	205	Troubleshooting and Maintenance	3	53–104, 53–134
53	235	Digital Circuits (2)	3	53–133, 53–134
53	236	Electronics (2)	3	53–134
53	237	Microprocessor Fundamentals	3	53–235
68	291	Biomedical Measurements (1)	3	53–131, 68–190
68	293	Therapeutic Equipment	3	53–131, 68–190
68	300	Field Training (2) **	4	68–200
68	306	Electronic Project	3	53–205
68	392	Biomedical Measurements (2)	3	68–291

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
68	294	Medical Imaging	3	53–133, 68–190
68	295	Hospital Supplies	3	53–131, 68–190
68	396	Maintenance of Biomedical Equipment	3	53–205
68	397	Computer Appl. in Biomedical Equipment	3	53–235, 68–190

Department of Electronic Engineering Technology

Major: Computer Engineering Technology

Code: 0455–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
53	104	Electronic Drafting and Workshop	3	
60	130	Computer Programming Language (1)	3	69–182
53	131	Electrical Circuits (1)	3	
53	132	Electrical Circuits (2)	3	53–131
53	133	Digital Circuits (1)	3	
53	134	Electronics (1)	3	53–131
60	200	Field Training (1) *	2	
60	205	Computer Maintenance	3	53–104
60	221	Computer Operating Systems	3	60–205, 60–130
60	233	Computer Programming Language (2)	3	60–130
53	235	Digital Circuits (2)	3	53–133, 53–134
53	237	Microprocessor Fundamentals	3	53–235
60	251	Digital Data Communication	3	53–133
60	254	Computer Networks (1)	3	53–133
60	300	Field Training (2) **	4	60–200
60	304	Computer Project	3	53–237, 60–130
60	349	Computer Architecture	3	53–235

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
60	212	Computer Applications (1)	3	60–130
60	232	Object Oriented Programming	3	60–130
60	234	Digital Logic Families	3	53–133, 53–134
60	243	Internet Programming	3	60–130
60	291	Introduction to Database	3	60–130
60	348	Microprocessor Peripherals	3	53–237
60	353	Computer Networks (2)	3	60–254
60	360	Selected Topics in Computer Engineering	3	60–130, 60–205, 60–254

COURSE DESCRIPTION

Department of Electronic Engineering Technology

53–104 Electronic Drafting and Workshop

Credits: 3 Hrs.: 7

Introduction to graphical symbols of electronic components, standards, and abbreviations. Schematic, block, and logic diagrams, printed circuit boards. Safety and good practice and procedures in workshop recognition of passive and active electronic components. Introduction to electrical measurements devices: voltmeters and ammeters. Hand tools and soldering.

53–131 Electrical Circuits (1)

Credits: 3 Hrs.: 6

Practical concepts of DC electrical circuits: current, resistance, and power. Circuit analysis techniques and theorems. Capacitance, inductance, and magnetic circuit operation.

53–132 Electrical Circuits (2)

Credits: 3 Hrs.: 6

Fundamentals of AC electrical circuits, phasors, and complex numbers. Analysis of RC, RL, and RLC circuits. Series and parallel resonances. Transformers and their applications.
Prerequisite: 53–131

53–133 Digital Circuits (1)

Credits: 3 Hrs.: 6

Fundamentals of binary and hexadecimal numbering systems. BCD and ASCII codes, truth tables and logic gate devices. Implementation of adders and subtractors, sequential circuits and flip flops.

53–134 Electronics (1)

Credits: 3 Hrs.: 6

Introduction to PN junction diodes in DC and AC applications. Transistors such BJTs and FET, MOSFET's DC and AC small signal analysis. Operational amplifiers: basic circuits and application.
Prerequisite: 53–131

53–138 Electronic Measurements

Credits: 3 Hrs.: 6

Measuring instruments theory of operation, calibration, and application, including AVO, DMM, and oscilloscopes. Signal generators and power supplies. Conversion of non–electrical quantities to electrical quantities through transducers.

53–163 Analog Communications

Credits: 3 Hrs.: 4

Introduction to analog modulation and demodulation techniques used in analog broadcasting and telephony, such as amplitude, frequency, and phase modulation. Representation of periodic and aperiodic signals in time and frequency domains.
Prerequisite: 53–134

53–200 Field Training (1)

Credits: 2 Hrs.: 8

Applied training in a working environment in relation to communication systems in public or private sector. A written technical report on the theory of operation and system set is required.

53–205 Troubleshooting and Maintenance

Credits: 3 Hrs.: 5

Basic concepts in system operation, testing, and troubleshooting. Calibration of different types of equipment and systems.
Prerequisite: 53–104, 53–134

53–235 Digital Circuits (2)

Credits: 3 Hrs.: 6

Application of different types of asynchronous and synchronous counters. Characteristics of TTL and CMOS. Study of medium–scale IC such as decoders, encoders, multiplexers, demultiplexers, and their applications. Data bussing interfacing with analog world using A/D and D/A conversions.
Prerequisite: 53–133, 53–134

53–236 Electronics (2)

Credits: 3 Hrs.: 6

Analysis of multistage amplifiers, active filters, power amplifiers and feedback oscillator circuits. Basic analog integrated circuits, voltage regulators, and wave shaping circuits.
Prerequisite: 53–134

53–237 Microprocessor Fundamentals

Credits: 3 Hrs.: 5

Introduction to 8085 microprocessor architecture, including bus system, map, and size. Assembly language programming. Input/output interfacing through programmable I/O devices, and asynchronous and synchronous communication.
Prerequisite: 53–235

53–255 Electromagnetic Applications

Credits: 3 Hrs.: 4

Wave propagation and transmission, including magnetic field propagation of waves in transmission lines and atmosphere. Effects of medium on wave propagation and transmission.
Prerequisite: 53–132

53–264 Digital Communications

Credits: 3 Hrs.: 4

Introduction to digital signal communications. Comparison of digital communication methods with analog communication methods. Methods of coding, modulation, and demodulation of signals.
Prerequisite: 53–163

53–300 Field Training (2)

Credits: 4 Hrs.: 16

Applied training in real–time communication devices and systems, including maintenance and troubleshooting. An oral presentation and a final written technical report are required.
Prerequisite: 53–200

53–306 Electronic project

Credits: 3 Hrs.: 5

Applied project in communication under the supervision of department faculty. A written report and oral presentation describing the project operation are required.
Prerequisite: 53–205

53–356 Microwave Communications

Credits: 3 Hrs.: 4

Microwave components and devices commonly used in microwave and wireless communication, including waveguides, passive components, actives microwave antennas transmitters, receivers, and relays.
Prerequisite: 53–255

53–357 Antenna Theory

Credits: 3 Hrs.: 4

Fundamental properties of antennas, types, transmission, and reception of electromagnetic waves. Effects of medium and atmosphere on wave propagation and applications in wireless networks.
Prerequisite: 53–255

53–358 Optical Communications

Credits: 3 Hrs.: 4

Operational principle of different components used in optical communication systems, including generation, transmission, manipulation, and detection of light. Passive and active devices in WDM systems.
Prerequisite: 53–163

53–365 Communication Electronics

Credits: 3 Hrs.: 5

Hardware implementation of AM and FM modulators/demodulators, including transmitter and receiver circuit. Multiplexing techniques such FDMA, and TDMA.
Prerequisite: 53–163

53–366 Selected Topics in Communication Engineering

Credits: 3 Hrs.: 3

Selected topics in communication theory and design covering the latest advances in communication technology.
Prerequisite: 53–163

53–367 Digital Communications Networks

Credits: 3 Hrs.: 3

Introduction to the basic concepts of communication networks. Protocols and layers. Basic transmission media and their characteristics; techniques of data transmission through communication network. Networks architectures and topologies such as LAN, WAN, and MAN. ATM and frame relay transmission techniques. Concepts of network security.
Prerequisite: 53–264

53–368 Modern TV Techniques

Credits: 3 Hrs.: 4

Fundamental concepts of analog and digital TV used in TV studios, broadcasting, and video networks. TV cameras, theory and functional blocks, monochrome and color TV, modulation schemes, DBS basic concepts, and DTV standard formats. Video recorder basics.
Prerequisite: 53–163

60–130 Computer Programming Language (1)

Credits: 3 Hrs.: 6

Introduction to structural programming, including memory concepts, decision making, and relational operators. Top–down control structures. Logical operators using repetition structure. Function definitions, prototypes, and application to modular programming. Declaring and storing for simple and multiple subscripted Arrays and Pointers.
Prerequisite: 69–182

60–200 Field Training (1)

Credits: 2 Hrs.: 8

Applied train in real life and practical work environment. A detailed presentation and technical report are required to complete the course.

60–205 Computer Maintenance

Credits: 3 Hrs.: 5

Introduction to hardware, peripherals, and software with emphasis on computer operations, terminology, and organization. Installation, configuration, maintenance, diagnoses, and troubleshooting of computer problems.
Prerequisite: 53–104

60–212 Computer Applications

Credits: 3 Hrs.: 5

Principles of database systems, including relational and hierarchical structures. Computer security and integrity. Database design and implementation of a real–life application using relational database tools.
Prerequisite: 60–130

60–221 Computer Operating Systems

Credits: 3 Hrs.: 6

Operating system. Structures and interrupt–based I/O. Dual–mode operation and hardware protection components. Synchronization, deadlock characterization, prevention, avoidance, and recovery. Memory management, virtual memory and file system organization.
Prerequisite: 60–130, 60–205

60–232 Object–Oriented Programming

Credits: 3 Hrs.: 5

Introduction to object–oriented programming Java application applets, control structures, methods, arrays, strings graphics and GUI components.
Prerequisite: 60–130

60–233 Computer Programming Language (2)

Credits: 3 Hrs.: 3

Object–oriented programming using Java class libraries, Java environment, and memory concepts, including arithmetic, equality, and relational operators. Java applets and its applications to the Internet. Control structures and formulating algorithms with top–down, stepwise refinement. Creating packages and controlling access to members within the super– and sub–classes for public, static, private, and protected class members.
Prerequisite: 60–130

60–234 Digital Logic Families

Credits: 3 Hrs.: 3

Basic electronic components such as diodes, transistors and FETs in the construction of digital logic gates. Switching operations of a transistor circuits and analysis of different logic families that constitute the building blocks of microprocessors in general.
Prerequisite: 53–133, 53–134

60–243 Internet Programming

Credits: 3 Hrs.: 5

Introduction to techniques for designing efficient algorithms using HTML and JAVA Applets in a dynamic programming environment. Graphics and strings modularity. abstraction, polymorphism, and inheritance of object oriental techniques.
Prerequisite: 60–130

60–251 Digital Data Communication

Credits: 3 Hrs.: 3

Introduction to digital data communication. Analog to digital conversion, baseband modulation techniques, and data scrambling schemes. Bandpass modulation schemes, data compression, data encoding, and error detection techniques. Relationship between bit and sample rates and their relation to channel bandwidth and capacity.
Prerequisite: 53–133

60–254 Computer Networks (1)

Credits: 3 Hrs.: 6

Introduction to computer networking, including local area networks, wide area networks, protocols, standards, topologies and architectures, TCP/IP addressing equipment, and network operating systems.
Prerequisite: 53–133

60–291 Introduction to Database

Credits: 3 Hrs.: 3

Introduction to algorithmic problem solving, basic data structures, arrays, stacks, queues, linked lists, and trees and graphs. Searching, sorting, and hashing techniques for different data structures.
Prerequisite: 60–130

60–300 Field Training (2)

Credits: 4 Hrs.: 16

Applied training related to computer applications in private or public institutions. A detailed oral presentation and written technical report are required upon completion of the course.
Prerequisite: 60–200

60–304 Computer Project

Credits: 3 Hrs.: 5

The design, construction, and presentation of an original project related to computer hardware and software. The project may be assigned to an individual student or team of students. Detailed written oral progress and final reports are required.
Prerequisite: 53–237, 60–130

60–348 Microprocessor Peripherals

Credits: 3 Hrs.: 5

Digital and analog serial and parallel interfacing, including counter, keyboard, timer, direct video, graphics, mouse, and disk. Hardware implementation of interrupts.
Prerequisite: 53–237

60–349 Computer Architecture

Credits: 3 Hrs.: 3

Computer design methodology, including levels, models, cache and virtual memories. Pipeline design techniques using RISC architecture, superscalar architecture, vector computers and multiprocessor systems.
Prerequisite: 53–235

60–353 Computer Networks (2)

Credits: 3 Hrs.: 5

Network topologies including bus, ring and star. WAN and remote activity including X25 and Frame Relay. ISDN DSL, SONET synchronous optical networks and implementation. TCP/IP services and utilities. Tool utilized Troubleshooting.
Prerequisite: 60–254

60–360 Selected Topics in Computer Engineering

Credits: 3 Hrs.: 3

Selected topics covering different aspects and trends in computer engineering technology.
Prerequisite: 60–130, 60–205, 60–254

68–190 Biomedical Principles

Credits: 3 Hrs.: 4

Introduction to biomedical theory, applications, and equipment. The main physiological systems of the human body, including a brief introduction to human anatomy, and common medical terminology used by the medical staff in hospitals.

68–200 Field Training (1)

Credits: 2 Hrs.: 8

Applied training through hospital workshop programs that introduces the basic routines for biomedical equipment and servicing. Oral and written technical reports detailing the theory of operation, common faults, and maintenance procedures of four commonly used equipment in the hospitals.
Prerequisite: 53–131, 68–190

68–291 Biomedical Measurements (1)

Credits: 3 Hrs.: 5

Introduction to bio–signal measurements and monitoring by collecting, conditioning, and displaying in–depth studies of diagnostic equipment such as ECG, EMC, and EEG. Focus on physiological background, theory of operation, calibration maintenance, inspection, safety, and report writing.
Prerequisite: 53–131, 68– 190

68–293 Therapeutic Equipment

Credits: 3 Hrs.: 5

Introduction to theory and application of common therapeutic equipment such as pacemakers, defibrillators, ventilators, hemodialysis machine, shortwave and microwave diathermy, electrosurgical generators, infusion and suction pumps, radiotherapy, and biomedical lasers.
Prerequisite: 53–131, 68–190

68–294 Medical Imaging

Credits: 3 Hrs.: 4

Introduction to common medical imaging modalities such as X–rays, CT, ultrasound, MRI, and nuclear medicine. Safety considerations, and advantages and shortfalls of each modality. Overview of digital image processing.
Prerequisite: 53–133, 68–190

68–295 Hospital Supplies

Credits: 3 Hrs.: 4

Introduction to the main hospital departments and major equipment and instruments used. Proper installation of medical equipment and their supply of water, gas, electricity, and ambient conditions required for operation.
Prerequisite: 53–131, 68–190

68–300 Field Training (2)

Credits: 4 Hrs.: 16

Applied training in biomedical equipment service and installation. Report writing and practice relevant to professional work environment.

68–306 Electronic project

Credits: 3 Hrs.: 5

Implementation of a project in the biomedical field under the supervision of department faculty. An oral presentation and final written technical report that describes the project in detail are required.
Prerequisite: 53–205

68–392 Biomedical Measurements (2)

Credits: 3 Hrs.: 5

Introduction to biomedical measurements principles and equipment, including blood pressure, flow, volume, composition, oximetry, spirometers, and related respiratory. Audiometers and acoustic measurements.
Prerequisite: 68–291

68–396 Maintenance of Biomedical Equipment

Credits: 3 Hrs.: 4

Introduction to classical and modern maintenance techniques and troubleshooting of biomedical equipment. Use of service manuals and testing devices safely and efficiently for fault finding.
Prerequisite: 53–205

68–397 Computer Applications in Biomedical Equipment

Credits: 3 Hrs.: 4

Introduction to computer hardware and software in various biomedical equipments. General and specific illustration of how to integrate biomedical equipment to provide functions such as storage, control, and communication.
Prerequisite: 68–190, 53–235

69–182 Computers

Credits: 3 Hrs.: 4

The main goal of this course is to give students a broad basic background on computers. Students will learn the basic skills needed to operate computers efficiently, which will help them in their academic study. Students will be introduced to an engineering application software. In addition, Students will learn skills of communication, learning and searching through the Internet.

69–200 Field Training (1)

Credits: 2 Hrs.: 8

Applied training in relation to electronics and its role in production fields. A written technical report on experience gained and description of the production operation.

69–270 Industrial Electronics

Credits: 3 Hrs.: 5

Basic theory of a process control system. Switching thyristors and triggering methods. Applications in the control of power, temperature, and liquid level.
Prerequisite: 69–273

69–273 Automatic Control

Credits: 3 Hrs.: 6

Basic concepts of control theory of open and closed loop systems. The block diagram representation is used to model a stable system. Introduction to transient and steady–state responses of simple closed loop control systems. Frequency response analysis, compensation, and stabilizing techniques for performance improvement.
Prerequisite: 53–134

69–300 Field Training (2)

Credits: 4 Hrs.: 16

Applied training in service industries. A written technical report and oral presentation detailing evaluated engineering tools and techniques are required.
Prerequisite: 69–200

69–306 Electronic Project

Credits: 3 Hrs.: 5

Applications of electronic principles to real–world project. Students will submit a status update and a final technical report that describes the project in detail.
Prerequisite: 53–205

69–371 Industrial Instrumentation

Credits: 3 Hrs.: 5

Study of electrical and electronic process sensors and actuators in a variety of applications. Practical application of complete systems.
Prerequisite: 53–138

69–372 Programmable Logic Controllers

Credits: 3 Hrs.: 5

Introducing the basic concepts and components of the main elements of a PLC. Topics include PLC programming, system monitoring, and interfacing control techniques.
Prerequisite: 53–235

69–374 Computer – Based Control

Credits: 3 Hrs.: 5

Basic concepts and practical aspects of computer–based control systems. General flowcharts of algorithms of microprocessors used in classical control strategies.
Prerequisite: 69–273

69–375 Microprocessor Applications

Credits: 3 Hrs.: 5

A study of microprocessor software, hardware, application and tools for implementation. A full account of an operable practical example, both in terms of hardware and software, will be implemented.
Prerequisite: 53–237

69–376 Robotics

Credits: 3 Hrs.: 4

Basic concepts and practical aspects of robotics, including history, geometry, end–effect, design, types, sensors and programming. Application of robotics in industries and end–operation.
Prerequisite: 69–273

Department of Laboratory Technology

Overview:

The Laboratory Technology curriculum provides theoretical and practical training for students in the fields of applied chemistry and applied physics. The department also offers basic courses, including mathematics for all college students.

Programs:

The department of Laboratory Technology offers the following specializations:

- Applied Physics
- Applied Chemistry

Laboratories:

Physics Laboratories:

- General Physics Laboratory
- Electricity and Magnetism Laboratory
- Thermal Physics Laboratory
- Sound and Properties of Matter Laboratory
- Physical Electronics and Instrumentation Laboratory
- Optics and optical Instruments Laboratory
- Modern and Advanced Physics Laboratory
- Computer Laboratory
- Bio Physics and Radiation Laboratory

Chemistry Laboratories:

- Analytical Chemistry and Environmental Laboratory
- General and Inorganic Chemistry Laboratory
- Glass Blowing Laboratory
- Instrumental Laboratory (I) & (II)
- Organic and Biochemistry Laboratory
- Petro–chemistry Laboratory
- Physical Chemistry Laboratory

Department of Laboratory Technology

Major: Applied Physics

Code: 0451–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
75	110	General Chemistry	3	
56	160	Electricity and Magnetism	3	
56	165	Thermal Physics	3	
56	166	Optics	3	
56	167	Properties of Matter	3	
56	168	Instrumentation	3	
56	169	Radiation Physics (1)	3	56–113
56	200	Field Training (1) *	2	
56	202	Physical Electronics	3	56–160
56	203	Modern Physics	3	56–113
56	205	Biophysics	3	56–113
56	206	Computer Applications in Physics	3	69–182
56	208	Waves and Sound	3	
56	260	Optical Instruments	3	56–166
56	267	Advanced Physics Laboratory	3	56–202
56	268	Radiation Physics (2)	3	56–169
56	300	Field Training (2) **	4	56–200

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
56	150	Astronomy	2	56–113
56	152	Solid State Physics	2	56–113
76	153	Introduction to Probability and Statistics	2	76–105
76	154	Advanced Mathematics (1)	2	76–106
76	155	Advanced Mathematics (2)	2	76–154
56	210	Environmental Physics	2	56–113
75	250	Glass Blowing	1	
56	263	Advanced Electronics	3	56–202
56	264	Laser	2	56–166
56	269	Physics Project	2	56–202
75	284	Stores Management	1	

Department of Laboratory Technology

Major: Applied Chemistry

Code: 0452–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
75	110	General Chemistry	3	
75	111	Analytical Chemistry	4	75–110
75	121	Inorganic Chemistry	3	75–110
75	130	Organic Chemistry	3	75–110
75	200	Field Training (1) *	2	
75	211	Instrumental Analysis (1)	4	75–111
75	212	Instrumental Analysis (2)	4	75–111
75	215	Environmental Pollution	3	
75	220	Nuclear and Radio Chemistry	3	75–110
75	231	Physical Chemistry (1)	3	75–110
75	241	Biochemistry (1)	3	75–130
75	270	Computer Applications in Chemistry	3	30–101
75	300	Field Training (2) **	4	75–200
75	310	Applied Analytical Chemistry	3	75–211, 75–212
75	331	Applied Organic Chemistry	3	75–130
75	333	Petrol and Petro–chemistry	3	75–130

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
76	153	Introduction to Probability and Statistics	2	76–105
76	154	Advanced Mathematics (1)	2	76–106
76	155	Advanced Mathematics (2)	2	76–154
56	158	Basic Physics	3	56–113
75	214	Sampling	1	
75	216	Drug Analysis	3	75–111
75	217	Nutritional Analysis	3	75–111
75	232	Physical Chemistry (2)	3	75–231
75	242	Biochemistry (2)	3	75–241
75	250	Glass Blowing	1	
75	272	Safety in Chemical Laboratories	2	
75	315	Literature Survey and Project	3	

COURSE DESCRIPTION

Department of Laboratory Technology

56–113 General Physics

Credits: 3 Hrs.: 4

Systems of units and conversion of units. Motion with constant acceleration and Newton's laws of motion. Work and energy, conservation of energy. Density, elasticity, Young's Modulus, Shear and Bulk Modulus, specific heat, thermal conductivity, and thermal expansion. Pressure in fluids, Archimedes' principle, and viscosity. Direct current circuits, Ohm's law, and resistors connections.

56–150 Astronomy

Credits: 2 Hrs.: 2

A journey in the sky: methods of observation, solar system, models, stellar radiation, stellar classification, pulsars, quasars, black holes, galaxies, and elements of cosmology.
Prerequisite: 56–113

56–152 Solid State Physics

Credits: 2 Hrs.: 2

Atomic binding and crystal binding, crystal defects, tools for studying structure of solids, x–ray diffraction, electron diffraction, electrical properties of solids, free electron model, band structure model, thermal properties of solids, thermal conductivity, thermal expansion, thermal electric power, optical processes in solids, optical materials, magnetic solids and super conductors.
Prerequisite: 56–113

56–158 Basic Physics

Credits: 3 Hrs.: 4

Rotational motion, torque, moment of inertia, conservation of angular momentum, gas laws and absolute temperature, evaporation, and boiling. Heat transfer, electric current, and Kirchoff's laws. Magnets and magnetic fields, motion of a charged particle in magnetic field, Ampere's law, and magnetic field of a straight wire.
Prerequisite: 56– 113

56–160 Electricity and Magnetism

Credits: 3 Hrs.: 4

Electric charge, Coulomb's law, electric field, Gauss's law, electric potential, potential energy, Ohm's law, resistance, resistors in series and parallel, electric power, Kirchoff's laws, capacitors, emf, potentiometer, the Wheatstone bridge, magnetic field, magnetic force on a current, and applications with a galvanometer.

56–165 Thermal Physics

Credits: 3 Hrs.: 4

Temperature and measurements, thermocouples, thermal expansion, kinetic theory of gases, heat, heat capacity, specific heat, latent heat, heat transfer by conduction, convection and radiation, the first law of thermodynamics, second law of thermodynamics, reversible and irreversible processes, entropy, and heat engines.

56–166 Optics

Credits: 3 Hrs.: 4

Properties of light, geometrical optics, spherical mirrors, thin lenses, thick lenses, physical optics, interference, diffraction and polarization of light, and applications.

56–167 Properties of Matter

Credits: 3 Hrs.: 4

Rotational motion, moment of inertia for rigid bodies, torque, conservation of angular momentum, elasticity, Hooke's law, elastic properties of solids, flow rate, Bernoulli's equation, its applications, viscosity and viscous fluids, flow in pipes, surface tension, capillaries, Newton's law of gravity, gravitational field (intensity and potential energy), escape speed, and Kepler's laws.

56–168 Instrumentation

Credits: 3 Hrs.: 5

Dimensional analysis, error analysis, graphical representation of experimental data and regression analysis, fine measurements (Vernier caliper, micrometer, and spherometer), galvanometer, potentiometer applications, Wheatstone bridge, resistivity, different methods of temperature measurements, and calibration methods of devices.

56–169 Radiation Physics (1)

Credits: 3 Hrs.: 4

Introduction to nuclear physics; natural radioactivity and emission of charged particles; radioactive decay series; and interaction of radiation with matter.
Prerequisite: 56–113

56–200 Field Training (1)

Credits: 2 Hrs.: 8

Practical training for a period of 7 weeks (175 hours) in a facility work environment related to the student major. Emphasis is laid on the application of science knowledge and technical skills acquired by the student through his/her first year and safety regulations. Practice of work ethics, team–work, and self–responsibility.

56–202 Physical Electronics

Credits: 3 Hrs.: 4

Band structure of semiconductors, intrinsic and extrinsic materials, N–type and P–type crystals, diodes and their current equation, Zener diode, LED diode, diode array, load line analysis, diode approximations and applications, BJT and FET transistors, structure, characteristics, operation, configuration, bias and applications. MOSFET, VMOS, CMOS, and ICS.
Prerequisite: 56–160

56–203 Modern Physics

Credits: 3 Hrs.: 4

Wave–particle duality of electrons, blackbody radiation, Planck's hypothesis, photoelectric effect, Compton effect, wave nature of matter, electron microscopes, atomic models, Bohr model, De Broglie hypothesis, quantum numbers, X–ray spectra, fluorescence and phosphorescence, lasers, bonding and banding in solids, and the structure and properties of the nucleus.
Prerequisite: 56–113

56–205 Biophysics

Credits: 3 Hrs.: 4

Force on and in the body; energy, work and power of the body; pressure in the body; skull; pressure in the digestive system and urinary bladder; the sensory system; hearing; vision; general senses; and physics of cardiov75–ular system.
Prerequisite: 56–113

56–206 Computer Applications in Physics

Credits: 3 Hrs.: 5

Importance of computers in physics; introduction to software package; statistical analysis of data; regression analysis; computer application in heat; computer application in waves, optics, electricity and magnetism; electronics; modern and nuclear physics; data acquisition; and teaching physics using computer.
Prerequisite: 69–182

56–208 Waves and Sound

Credits: 3 Hrs.: 4

Wave terminology, waves characteristics, energy transmission, super position, reflection of waves, standing waves (applications), sound waves, speed of sound, quality of sound, interference of sound waves, beats (applications), shock waves and sonic boom, production and reception of human sound, and ultra–sonic applications.

56–210 Environmental Physics

Credits: 2 Hrs.: 2

Energy, power, conservation of energy, energy technology and crisis, fossil fuel resources, effects of industry and use of energy on modern society, and environmental pollution and possible solutions.
Prerequisite: 56–113

56–260 Optical Instruments

Credits: 3 Hrs.: 5

Lens aberrations, photography, spectrophotometers, microscope, electron microscopy, and common optical instruments.
Prerequisite: 56–166

56–263 Advanced Electronics

Credits: 3 Hrs.: 4

Amplification, approximate and complete hybrid equivalent model, FET small signal model, JFET fixed bias,, digital and analog system, BCD code, Alphanumeric code, logic gates, Boolean theorems, IEEE/ANSI started logic symbols, sum of products form, logic circuits, clock signals and types of clocked flip flops and their applications.
Prerequisite: 56–202

56–264 Laser

Credits: 2 Hrs.: 2

Laser and the different types of atomic transitions, necessary conditions for producing lasers, and types of lasers and production technologies. Laser applications in the following: industry, communications, environment, medicine, research, and military areas.
Prerequisite: 56–166

56–267 Advanced Physics Laboratory

Credits: 3 Hrs.: 5

Gas flow at low pressure, pumping performance parameters, types of vacuum pumps and vacuum systems, leak detection and vacuum measurements, thin films technology, deposition methods, thickness measurements, basics of laser production and technology, lasers types, application of laser in physics, biology, medicine, and industry.
Prerequisite: 56–202

56–268 Radiation Physics (2)

Credits: 3 Hrs.: 4

Sources of natural and artificial radiation. Application of ionizing radiation and radioisotopes in different fields in life, such as industrial and medical fields. Generation of energy using radiation and nuclear technology. Radioactive environmental pollution. Biological effects of radiation.
Prerequisite: 56–169

56–269 Project

Credits: 2 Hrs.: 4

Students have to submit a research project in any of the following subjects: electronics, optics, sound, solid state physics, radiation, environment protection and other areas of physics that are approved by the department.
Prerequisite: 56–202

56–300 Field Training (2)

Credits: 4 Hrs.: 16

Practical training for a period of 15 weeks (300 hours) in a facility related to the student major. Emphasis is laid on operation, maintenance, and control of technical systems, equipment setup, commissioning, and calibration (or installation), and safety and environment.
Prerequisite: 56–200

75–110 General Chemistry

Credits: 3 Hrs.: 4

Chemical concepts emphasize the basic principles of physical, inorganic, and organic chemistry. Topics include the following: atomic structure, the periodic table, chemical bonding, states of matter, solutions, chemical equilibrium, oxidation and reduction, electrochemistry, and introductory organic chemistry.

75–111 Analytical Chemistry

Credits: 4 Hrs.: 6

Major methods of gravimetric and volumetric analysis used by analytical chemists. Topics include acid base, complexometric, precipitation, redox titrations and elementary spectrophotometry. Theoretical and practical perspectives of chemical analysis are considered.
Prerequisite: 75–110

75–121 Inorganic Chemistry

Credits: 3 Hrs.: 4

Review of atomic theory/structure and periodic trends; models of structure and bonding, including the type of bonds, chemistry of the main group elements; and introduction to transitions metal chemistry. A survey of the properties and chemical reactions of the elements and their compounds.
Prerequisite: 75–110

75–130 Organic Chemistry

Credits: 3 Hrs.: 4

Fundamentals of organic chemistry, including nomenclature, structures, properties, functional groups, and basic reactions of the important classes of organic compounds. The principles of stereochemistry, reaction mechanisms and synthesis are presented.
Prerequisite: 75–110

75–142 Basic Chemistry

Credits: 3 Hrs.: 4

This course is an introduction to the principles of chemistry for students in science and engineering. Topics include structure of matter, atomic and molecular theory (law of conservation of matter), electronic structure, chemical bonding, the elements, periodicity, stoichiometry (quantitative relationships), chemical equations, aqueous solutions, oxidation and reductions.

75–200 Field Training (1)

Credits: 2 Hrs.: 8

Practical training for a period 7 weeks (175 hours) in a facility work environment related to the student major. Emphasis is laid on the application of science knowledge and technical skills acquired by the student through his/her first year and safety regulations. Practice of work ethics, teamwork, and self–responsibility.

75–211 Instrumental Analysis (1)

Credits: 4 Hrs.: 6

Introduction to the principles and methods for analyzing chemicals using appropriate instrumentation. Modern analytical methods will be discussed in lectures. Laboratory exercises will emphasize the simple preparation and use of electrochemical methods, colorimetric and other optical analytical methods.
Prerequisite: 75–111

75–212 Instrumental Analysis (2)

Credits: 4 Hrs.: 6

A continuation of 75– 211 with the introduction of the theory and application of spectroscopic methods for the analysis of molecular structures using spectrophotometers (UV, VIS, and IR), chromatographs (GC and HPLC). Laboratory exercises will emphasize the simple preparation and use of spectrophotometers, chromatographs, and atomic spectroscopy.
Prerequisite: 75–111

75–214 Sampling

Credits: 1 Hrs.: 2

Techniques and devices of sampling in diverse media will be treated, followed by a discussion of sample treatment prior to analysis including isolation, concentration and fractionation of analytes and classes of analytes.

75–215 Environmental Pollution

Credits: 3 Hrs.: 4

Sources, types, and effects of air and water pollutants. Students study air and water quality analyses and pollution control techniques. Laboratory exercises include measurement of particulates in air and chemical analysis of airborne and water pollutants.

75–216 Drug Analysis

Credits: 3 Hrs.: 2

Approach to medicinal chemistry and an introduction to pharmacology, physical and chemical properties of drugs; types of chemical, principles of solubility, solution equilibria, chemical kinetics, heterogeneous systems and solids. The influence of biochemistry, formulation, and forensic considerations on such assays is presented.
Prerequisite: 75–111

75–217 Nutritional Analysis

Credits: 3 Hrs.: 2

Chemical properties of food constituents discussed in relation to their effect on processing, nutrition, and spoilage. Laboratory experiments on principles and applications of food dehydration, thermal processing, low–temperature preservation, chemical and biochemical preservation, irradiation, packaging, manufacturing, and water and waste management.
Prerequisite: 75–111

75–220 Nuclear and Radio Chemistry

Credits: 3 Hrs.: 3

Atom and its nucleus, radioactive decay, nuclear masses, and nuclear stability, nuclear reactions, interaction of nuclear radiation with matter, counters, and radiation safety precautions.
Prerequisite: 75–110

75–231 Physical Chemistry (1)

Credits: 3 Hrs.: 4

Introduction to the physical chemistry of solids, liquids and gases; electrochemistry, chemical phase equilibrium, thermodynamics and kinetics; and the application and importance of chemistry and technology in industry. Laboratory exercises emphasize the applications of topics associated with thermodynamics and phase equilibrium.
Prerequisite: 75–110

75–232 Physical Chemistry (2)

Credits:3 Hrs.: 4

Introduction to electrochemistry, thermodynamics, and corrosion of metals. Emphasizes the applications on galvanic cells and electroplating. Some qualitative analyses are included. Selected experiments to cover the theoretical part.
Prerequisite: 75–231

75–241 Biochemistry (1)

Credits: 3 Hrs.: 4

Chemistry and biochemical interrelationship of carbohydrates, lipids, and nucleic acids; enzyme catalysis and introduction to metabolism. Laboratory exercises include the study of pH and buffers, carbohydrates, lipids, proteins and enzyme kinetics. Qualitative and quantitative methods employing instrumental analysis are included.
Prerequisite: 75–130

75–242 Biochemistry (2)

Credits:3 Hrs.: 4

Chemistry of vitamins, trace metals and important agents in metabolic control. Laboratory experiments on standard curve for protein analysis as well as spectrophotometric quantitation, isolation and partial purification of biomolecules using centrifugation, liquid column chromatography, salts, heat treatment and electrophoresis.
Prerequisite: 75–241

75–250 Glass Blowing

Credits: 1 Hrs.: 3

A laboratory course on the manufacture, use, and repair of scientific glassware. Six types of seals are constructed; a student–designed project is required.

75–270 Computer Applications in Chemistry

Credits: 3 Hrs.: 5

Introduction to the language of BASIC, and the use of microcomputing in chemistry. The topics included in the course are the Windows Operating System, numerical methods associated with chemical computations and instructions for the use of PC–based application programs.
Prerequisite: 30–101

75–272 Safety in Chemical Laboratories

Credits: 2 Hrs.: 2

A comprehensive introduction to the field of environmental health science. How to identify and counter laboratory hazards, including flammable, explosive, and toxic compounds. This course emphasizes the roles and responsibilities of industrial chemists.

75–284 Stores Management

Credits: 1 Hrs.: 1

Identifying materials required for storing processes: handling and manipulation, labeling and indexing, protection of materials, and storing restrictions.

75–300 Field Training (2)

Credits: 4 Hrs.: 16

Practical training for a period of 15 weeks (300 hours) in a facility related to the student major. Emphasis is laid on operation, maintenance, and control of technical systems, equipment setup, commissioning, calibration (or installation), and safety and environment.
Prerequisite: 75–200

75–310 Applied Analytical Chemistry

Credits: 3 Hrs.: 5

Introduction to advanced techniques and instrumentation used in modern inorganic chemistry, materials science, physical chemistry and analytical chemistry. Emphasis is laid on synthetic methods and spectroscopic techniques for structure determination, material characterization, and chemical process technology.
Prerequisite: 75–211, 75–212

75–315 Literature Survey and Project

Credits: 3 Hrs.: 4

An individual research project that includes training in advanced laboratory skills, and the use of online searching techniques under the guidance of a faculty member. Students are required to submit a written report about the experiments, including important applied chemistry procedures.

75–331 Applied Organic Chemistry

Credits: 3 Hrs.: 4

Introduction to spectroscopic characteristics of organic compounds. Aspects of aromatic chemistry, heterocycles, nitrogen compounds, polymers, and biologically important molecules. Laboratory experiments on the synthesis and purification of compounds with identification and analysis by employing spectroscopic methods.
Prerequisite: 75–130

75–333 Petrol and Petro–Chemistry

Credits: 3 Hrs.: 4

Petroleum refining, catalytic and thermal petrochemical processes, soaps and detergents, and specialty chemicals are presented at the industrial level. Production of petrochemicals. Catalytic and thermal processes. ASTM methods will be surveyed and used to analyze authentic samples. Separation of petroleum by flash vaporization and by distillation.
Prerequisite: 75–130

76–105 Basic Mathematics (1)

Credits: 3 Hrs.: 3

This course prepares the students for the use of calculus. It emphasizes techniques of problem solving using algebraic concepts. The major topics include fundamental concepts of algebra and analytic trigonometry; solving equations and inequalities; the graphs of basic functions of one variable and their inverses; solving systems of linear equations using Cramer's rule.

76–106 Mathematics (2)

Credits: 3 Hrs.: 3

This course emphasizes the study of calculus with analytic geometry. It covers the following topics: 3D coordinate systems, vectors, dot and cross products; limits and continuity; basic rules for differentiating functions; indefinite and definite integrals of functions; numerical integration. Applications include simple maximum and minimum problems, area between curves and work done by a force.
Prerequisite: 76–105

76–153 Principles of Probability and Statistics

Credits: 2 Hrs.: 3

This course covers basic concepts of probability and descriptive statistics. Classical probability, empirical probability, probability distributions, Poisson approximation to the binomial distribution and normal approximation to the binomial distribution are explored. Other topics covered include population, sampling, general frequency, measures of central tendency, and measures of dispersion.
Prerequisite: 76– 105

76–154 Advanced Mathematics (1)

Credits: 2 Hrs.: 3

This course emphasizes the use of differential calculus of functions of several variables. Topics include powers and roots of complex numbers; derivatives and differentials; vector differential calculus; solutions of differential equations, second order linear differential equations with constant coefficients. Applications of techniques include alternating current (ac) circuits.
Prerequisite: 76–106

76–155 Advanced Mathematics (2)

Credits: 2 Hrs.: 3

This course consists of problem–solving techniques in engineering mathematics. Topics include: elementary row operations on matrices, Gaussian elimination; polynomial approximation; numerical integration; numerical solutions of differential equations; Laplace transformation.
Prerequisite: 76–154

Department of Manufacturing Engineering Technology

Overview:

The main objective of this department is to perform a qualifying technical and applied program for higher education students considering the quantity and quality of the manufacturing processes and their required management, maintenance and replacement processes. Additionally, departmental duties also include performing applied research related to a wide spectrum of technological topics and the arrangement of many short courses, lectures and seminars that are directed to environmental needs, market requirements and continuous educational programs. The Department is divided into two main academic divisions: Manufacturing and Welding Technology. The mechanical production division covers a wide domain of technological topics in different branches such as metrology and accuracy, material technology, conventional and advanced manufacturing techniques and maintenance processes. The welding division covers a wide area of different conventional and advanced welding processes.

Majors:

The department offers two areas of specialization:

- Manufacturing Engineering Technology
- Welding Engineering Technology

Laboratories:

- Central College Workshops, which include machining, welding, forging, fitting (or filing), casting and fabrication of sheet metals workshops
- Materials and mechanical testing Laboratory
- Numerical Control and CAD and Computer Numerical Control (CNC) Laboratories
- Heat Treatment Laboratory
- Metrology Laboratory

Department of Manufacturing Engineering Technology

Major: Manufacturing Engineering Technology

Code: 0402–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
64	104	Computer Aided Mechanical Drawing	3	64–103
64	114	Foundry and Welding Processes	3	64–105
64	130	Machining Processes (1)	3	64–105
64	141	Metrology and Measurements	3	
64	162	Engineering Materials	3	
64	170	Electricity for Machinery	3	
64	200	Field Training (1) *	2	
64	215	Metal Forming	3	64–114
64	231	Machining Processes (2)	3	64–130
64	233	Machining Processes (3)	3	64–130
64	237	Computer Numerical Control	3	64–130
64	253	Material Handling and Inventory	3	
64	254	Quality Control	3	64–141
64	260	Engineering Mechanics	3	
64	263	Physical Metallurgy	3	64–162
64	300	Field Training (2) **	4	64–200
64	323	Machines and Equipment Maintenance	3	64–130

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
64	257	Production Planning and Control	3	
67	266	Non–Destructive Testing	3	64–162
64	273	Mechatronics	3	64–170
64	280	Thermodynamics	3	76–105
64	281	Fluid Mechanics	3	76–105
64	316	Non–Conventional Manu. Processes	3	64–231
64	332	CAD / CAM	3	64–237
64	356	Operations Research	3	30–101, 76–105
64	364	Non–Metallic Engineering Materials	3	64–162
64	399	Production Projects	3	64–130, 64–215

Department of Manufacturing Engineering Technology

Major: Welding Engineering Technology

Code: 0406–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
64	104	Computer Aided Mechanical Drawing	3	64–103
64	115	Manufacturing Processes	3	64–105
67	132	Welding Technology (1)	3	64–105
64	141	Metrology and Measurements	3	
64	162	Engineering Materials	3	
64	170	Electricity for machinery	3	
67	200	Field Training (1) *	2	
67	233	Welding Technology (2)	3	67–132
67	234	Welding Technology (3)	3	67–132
64	254	Quality Control	3	64–141
64	260	Engineering Mechanics	3	
64	263	Physical Metallurgy	3	64–162
67	265	Welding Metallurgy	3	64–263
67	266	Non–Destructive Testing	3	64–162
67	300	Field Training (2) **	4	67–200
67	335	Special Welding Processes	3	67–233
67	381	Welding Specifications and Costing	3	

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
64	215	Metal Forming	3	64–115
64	253	Material Handling and Inventory	3	
64	257	Production Planning and Control	3	
64	273	Mechatronics	3	64–170
64	280	Thermodynamics	3	76–105
64	281	Fluid Mechanics	3	76–105
64	323	Machines and Equipment Maintenance	3	
64	364	Non–Metallic Engineering Materials	3	64–162
67	336	Polymer Joining	3	64–162
67	399	Welding Projects	3	64–115, 67–132

COURSE DESCRIPTION

Department of Manufacturing Engineering Technology

64–103 Engineering Drawing

Credits: 2 Hrs.: 4

An instrument–drawing course. Students will learn basic skills, including free hand sketch, instruments used, lettering and sketching, geometric construction, orthographic projection of normal, inclined, oblique, and cylindrical surfaces, auxiliary views and sectional views. Students are introduced to the specialized drawings in their specific field.

64–104 Computer Aided Mechanical Drawing

Credits: 3 Hrs.: 5

Different systems of drawing standards, descriptive geometry, and technical drawing. Such aspects are covered both manually and by computer. Special attention is directed particularly toward the drawing of mechanical engineering components and their detailed assembly considerations.
Prerequisite: 64–103

64–105 Workshop Technology

Credits: 1 Hrs.: 3

A supportive practical course for all new college attendees as an introduction to technical courses and machinery basics. The students are introduced to the basic operations in at least five workshops: welding, filing, sheet metal forming, foundry, and turning. On the completion of the course, students will be able to recognize material types and the basic manufacturing operations.

64–114 Foundry and Welding Processes

Credits: 3 Hrs.: 5

Various types of casting and welding processes used in manufacturing. The intent of this course is to teach students the general capabilities of several fundamental foundry and welding processes. On the completion of this course, a student should have a general understanding of the integrated processes, where the specialized machines and operation principles can be implemented to produce a desired product.
Prerequisite: 64–105

64–115 Manufacturing Processes

Credits: 3 Hrs.: 5

A supplementary course for students specialized in welding technology to have basic knowledge about the different machining operations. On the completion of this course, student should be able to recognize most of the hand and power workshop tools and machines. Practical and training classes provide students with the skills required to operate and implement most of the conventional machine tools.
Prerequisite: 64– 105

64–130 Machining Processes (1)

Credits: 3 Hrs.: 5

This is one of three consecutive courses to study both theoretical and practical features of the machining operation, which is the backbone of the manufacturing technology. Technical background is given in this course regarding the general safety measures in workshop, the skills development in manipulating hand tools, as well as drawing interpretation and work layout. Fundamentals of single point tool machining are also covered by studying turning operation with applications on turning lathes.
Prerequisite: 64–105

64–141 Metrology and Measurements

Credits: 3 Hrs.: 4

A general view of several types of measurements and their principles associated with manufacturing processes and activities. Topics include the measurement of both linear and angular dimensions together with the accuracy assessment of the manufactured surfaces. Linear measurements (length and diameter), angular measurements, screw thread measurement, accuracy concept, interchangeability, fits and tolerances, gauges, surface quality, motion and vibration measurements, pressure, and flow measurements are the main parameters to deal with.

64–162 Engineering Materials

Credits: 3 Hrs.: 4

Atomic bonding, structure of crystalline solids, metallic and non–metallic materials, mechanical behavior and properties of metals and mechanical failure modes of materials systems. Fundamental principles underlying the correlation between mechanical properties and microstructure.

64–170 Electricity for Machinery

Credits: 3 Hrs.: 4

Electrical and electronic concepts of mechanical machinery used in different manufacturing processes. Background knowledge regarding electric and electronic features relevant to manufacturing are also introduced. Special attention is devoted to the fundamentals of electric machines such as motors, transformers, and generators. Circuits and electromechanical aspects.

64–200 Field Training (1)

Credits: 2 Hrs.: 8

Students attend and participate in local manufacturing plants and sites to gain shop floor knowledge and experience. The training program includes topics more relevant to manufacturing activities, such as foundry, forming, sheet metal, machining, welding, and inspection.

64–215 Metal Forming

Credits: 3 Hrs.: 5

Sheet metal forming and cutting, forging, rolling, drawing, bending, extrusion, and many other special metal forming processes. Particular emphasis is devoted to the operations adopted in local industries. Analysis of various metal forming processes to determine engineering requirements necessary for a particular metal forming operation; information is used to select equipment and tools.
Prerequisite: 64–114

64–231 Machining Processes (2)

Credits: 3 Hrs.: 5

Technical background is given regarding some conventional machine tools operations such as drilling and milling. Also, a sufficient background is provided on the theory of metal cutting and technology of cutting tools.
Prerequisite: 64–130

64–233 Machining Processes (3)

Credits: 3 Hrs.: 5

Technical background is given regarding more advanced conventional machine tools operations such as grinding, broaching, and boring. The basics of establishing processes sheets for multi–operations component is emphasized. Additionally, many other aspects are studied, such as a brief conclusion about nontraditional and chipless machining operations. Mass production machines attachments and accessories are also covered.
Prerequisite: 64–130

64–237 Computer Numerical Control

Credits: 3 Hrs.: 5

Main aspects of Numerical Control technology (NC): Numerical control (NC), computer numerical control (CNC), and direct numerical control (DNC). Both absolute and incremental positioning systems are studied in both open and closed loops systems. Different CNC techniques such as the point–to–point (PTP) and contouring machining systems. Both manual and computer–aided programming techniques are studied using EIA (G M codes) standard and non–standard programming languages.
Prerequisite: 64–130

64–252 Industrial Management

Credits: 2 Hrs.: 2

Various aspects of industrial management such as plant layouts, organizational structure, required machines, tools and manpower are studied. In addition, production quality and requirements are also emphasized. The course also involves the issue of time and motion study, health and safety policies, and procedures.

64–253 Material Handling and Inventory

Credits: 3 Hrs.: 4

Material handling systems with applications as related to manufacturing industries. Students will be involved in case studies, economic models, and problem solving of manufacturing material handling systems. Topics include bar coding, cranes, lift trucks, robots, and conveyor systems.
Providing students with basic knowledge for Inventory. Stores: importance, functions, site selection and inventory classification (ABC system). Inventory control: periodic and continuous review, and economic order quantity (EOQ).

64–254 Quality Control

Credits: 3 Hrs.: 4

Main concepts of quality production and their relation to standardization. Philosophy and concept of quality control, quality assurance, inspection, probabilities and statistics, control charts, and national and international standard organizations.
Prerequisite: 64–141

64–257 Production Planning and Control

Credits: 3 Hrs.: 4

The production planning and control systems are one of the basic activities that determine the effectiveness of a production enterprise. This course covers all management decisions, polices, plans, and actions that relate to optimization of manufacturing objectives.

64–260 Engineering Mechanics

Credits: 3 Hrs.: 4

Principles of static, resultant of coplanar force system, analysis of structures, centroids, and center of gravity. Area moment of inertia, stress and strain, stress consideration, torsion in circular sections, shear and bending moment in beams, and stress in beams are also covered.

64–263 Physical Metallurgy

Credits: 3 Hrs.: 5

Metallic structure, equilibrium diagrams, “C” curves and various types of heat treatment processes will be covered. Fundamentals of phase’s transformations and binary phase diagrams, iron–iron carbide phase diagram, and principles of heat treatment of various alloys are emphasized. The students will gain practical experience in different types of heat treatment processes.
Prerequisite: 64–162

64–273 Mechatronics

Credits: 3 Hrs.: 3

An elective course for students specialized in production technology to establish a comprehensive connection between mechanical and electronic systems. It describes, in general, how physical and mechanical quantity is provided using electric and electronic phenomena. Topics include the fundamentals of transducers and sensors that are often used in manufacturing machines and systems.
Prerequisite: 64–170

64–280 Thermodynamics

Credits: 3 Hrs.: 3

Introducing the concepts and laws of engineering thermodynamics and their application to thermal systems analysis and design. The main topics of the course include some basic definitions, properties of pure substances, work and heat, the first law of thermodynamics for closed and open systems, the concept of entropy, heat engines, refrigerators and heat pumps, adiabatic efficiency, availability analysis, and the second law of thermodynamics for closed and open systems.
Prerequisite: 64–105

64–281 Fluids Mechanics

Credits: 3 Hrs.: 4

Concepts and laws of fluid mechanics and their application to fluid transport systems analysis and design. The main topics of this course include some basic definitions, fluid static, pressure distribution in a fluid, manometers, hydrostatic forces on plane surfaces, submerged curved objects, balance laws of mass and linear momentum, fluid dynamics, Bernoulli's equation, flow in circular pipes with and without frictional and minor losses, and dimensional analysis.
Prerequisite: 64–105

64–300 Field Training (2)

Credits: 4 Hrs.: 16

Application of studied theories and practice in the field sites of manufacturing processes activities. Local factories and plants should be globally scanned within this course as well as field training course (1). Integration and cooperation between colleges and field sites are emphasized to ensure the achievement of the course(s) goals.
Prerequisite: 64–200

64–316 Non–Conventional Manufacturing Processes

Credits: 3 Hrs.: 4

An elective course for students specialized in production technology to shed light on the various non–conventional and non–traditional machining and chipless processes such as EDM: laser cutting, plasma cutting, and chemical machining. Also, some other specific operations are included, such as honing, lapping, polishing, and burnishing.
Prerequisite: 64–231

64–323 Machines and Equipment Maintenance

Credits: 3 Hrs.: 5

Importance of maintenance, wear and service life of equipment are discussed. Defects and repair methods of different machine parts, guide surfaces, gears and keys, shafts and bearings, spline shafts, couplings and clutches, leadscrew and nuts, threaded joints, vee belt drive, machine hydraulics, and seals and packing are also studied together with the restoration of worn parts to be welded, metallization and plating, and lubrication.

64–332 CAD / CAM

Credits: 3 Hrs.: 5

Modern manufacturing computer operated systems. The course describes the common interface between design and manufacturing. The basics of solid model structure are considered together with the associated design features such as scaling, rotation, and transformation. Techniques for the generation and the verification of the CNC program are also covered as an input stage to CAM. Additionally, some advanced topics are also included, such as the features of the different adaptive control (AC) machining systems.
Prerequisite: 64–237

64–356 Operations Research

Credits: 3 Hrs.: 4

Providing an overall knowledge of quantitative methods with regard to decision making. It covers the main concepts, tools and techniques used in problems solving to help manufacturing companies to improve their performance.
Prerequisite: 30–101

64–364 Non–Metallic Engineering Materials

Credits: 3 Hrs.: 4

Introducing various non–metallic materials used in industry such as polymers, ceramics, composites, and construction materials. Structure, properties, and uses of such materials are also covered.
Prerequisite: 64–162

64–399 Production Projects

Credits: 3 Hrs.: 5

Design and manufacture of an integrated useful mechanical component, machine or device. Novel and state of the art concepts are emphasized. Also, the project should reflect the technical background obtained through the past semesters.
Prerequisite: 64–130

67–132 Welding Technology (1)

Credits: 3 Hrs.: 5

Basic principles of fusion welding processes. Manual Metal Arc Welding (MMAW), types of welding machines, types of joints and joint preparation, and classification system for electrodes used in carbon steel welding will be covered. Oxy Acetylene Welding theory, application, and equipment will be discussed in this course. Topics covered also include safety precautions for welding processes, the factors affecting residual stresses, distortion, and fatigue in welded joints, and soldering and brazing processes. In the welding workshop, joints preparation, soldering and brazing, gas welding and arc welding application practices will be performed on carbon steel specimens.
Prerequisite: 64–105

67–200 Field Training (1)

Credits: 2 Hrs.: 8

Students must attend and participate at local manufacturing plants and sites to gain shop floor knowledge and experience. The training program includes topics more relevant to welding activities and techniques in addition to other manufacturing operations such as foundry, forming, sheet metal, machining, welding, and inspection.

67–233 Welding Technology (2)

Credits: 3 Hrs.: 5

Fundamental aspects, principles, and practice of gas shield metal arc welding processes, i.e. MIG, MAG, TIG, and PAW. The assembly of equipment, types of power sources, electrodes and wires used in welding, types of troche, and feed units will be covered in this course. The principles, equipment and consumables, flux, and feed wire units of submerged arc welding process will also be emphasized. During practice in the workshop, the student will gain skills for conducting and performing satisfactory weld joints by these processes using carbon steel specimens.
Prerequisite: 67–132

67–234 Welding Technology (3)

Credits: 3 Hrs.: 5

Providing students with an understanding of the fundamental principles of solid state welding by electrical resistance processes such as spot, seam, projection and flash welding. Welding Cycle, equipment and electrodes or guns will be emphasized. This course includes a comprehensive treatment of welding characteristics of selected ferrous alloys (i.e. gray cast iron, and stainless steels) and non–ferrous alloys (i.e. copper alloys, aluminum alloys, and nickel alloys) and gives spot light about the metallurgical properties and difficulties of welding these alloys. The students will also study theory and applications of flame cutting of metals. Arc cutting, plasma arc cutting, and under water cutting processes will be covered.
Prerequisite: 67–132

67–265 Welding Metallurgy

Credits: 3 Hrs.: 4

Metallurgical characteristics of welded structures. Building upon physical metallurgy principles learned in previous courses. When the students finish this course, they will know how the microstructure evolves in the different regions of both fusion welds and solid state welds. The students will also learn about the concept of weldability: the ability of a welded structure to be free of defects and being capable of meeting its intended application.
Prerequisite: 64–263

67–266 Non–Destructive Testing

Credits: 3 Hrs.: 4

Main concept and aim of non–destructive testing of materials as applied to the inspection of the integrity of different joints and structures. The course provides the theoretical principles of conventional NDT methods and their capabilities and limitations. It also introduces different NDT techniques: visual, dye penetrate, magnetic particle, ultrasonic, radiographic, and Eddy Current methods. Application of NDT to inspection of joints, quality process control, and accept/reject criteria is emphasized. The practical sessions of this course include hands–on experiments by students for different NDT techniques. The associated laboratory session is designed to demonstrate calibration procedures, perform inspection techniques, and interpret the indications received from different discontinuities.
Prerequisite: 64–162

67–300 Field Training (2)

Credits: 4 Hrs.: 16

Application of studied theories and practice in the field sites of welding and activities of manufacturing processes. Local factories and plants should be globally scanned within this course as well as field training course (1). Integration and cooperation between colleges and field sites are emphasized to ensure the achievement of the course(s) goals.
Prerequisite: 67–200

67–335 Special Welding Processes

Credits: 3 Hrs.: 5

Fundamental principles of some of new and special welding processes, such as friction welding, cold pressure welding, diffusion bonding, ultrasonic welding, laser beam welding, electron beam welding, explosive welding, electro slag welding, thermit welding, and underwater welding. These welding processes will be discussed with emphasis on principles and applications in industry.
Prerequisite: 67–233

67–336 Polymer Joining

Credits: 3 Hrs.: 4

Basic characteristics of polymers, structures, and welding, and joining of polymers by practice exercises. Several methods for joining polymers such as hot air welding, friction welding by mechanical means and ultrasonic friction, heat welding with metal plates or probes, solvent welding, adhesive bonding and dielectric heating and weld of plastic will be covered. The course will also discuss inspection and testing methods for polymers. During practice in workshop and lab, students will gain skills to conduct and perform satisfactory joining by these processes. In addition, they will perform inspection and tests for polymers.
Prerequisite: 64–162

67–381 Welding Specifications and Costing

Credits: 3 Hrs.: 4

Knowledge and skills necessary for reading welding blueprints and related blueprints and the knowledge of the welding symbols and joints. For welding costing, the student will be provided with the knowledge of the welding cost parameters and their importance. This course will also provide the student with an overview of the topic of welding codes and standards. It will introduce the student to the types and titles of standards that have been developed by various organizations for the specification and control of industrial welding. In addition, it will describe recommended philosophies for interpreting and applying some of the more commonly used standards. The three most widely used welding codes, AWS D1.1, ASME Sections VIII, IX and B31.1, and API 1104 will be covered.

67–399 Welding Projects

Credits: 3 Hrs.: 5

Design and manufacture of an integrated useful mechanical component, machine, or device. Novel and state of the art concepts regarding different welding techniques are emphasized. Also, the project should reflect the technical background obtained through the past semesters.
Prerequisite: 64–115, 67–132

Department of Mechanical Power and Refrigeration Technology

Overview:

The Mechanical Power and Refrigeration Department is dedicated to achieving the following objectives:

- To prepare specialized technical labor in the fields of mechanical power and refrigeration so that they meet the requirements of all governmental and private sectors. This is realized through regular educational and special training programs that lead to the required outcome.
- To offer engineering and technical consultation and to conduct applied research in the field of mechanical power and refrigeration and other related fields. This, in turn, helps to improve the performance levels in the industrial organizations.
- To develop the scientific and professional potentialities of the teaching staff through engineering and technical research activities.

Majors:

The department offers two areas of specialization:

- Mechanical Power Technology
- Air Conditioning and Refrigeration Technology

Laboratories:

Mechanical Power and Refrigeration Department has a variety of workshops and laboratories necessary to meet its requirements and to achieve its applied educational philosophy through the integration between theoretical study and practice.

- Air–conditioning laboratory
- Applied mechanics laboratory
- Basic skills workshop and Projects workshop
- Central air–conditioner equipment workshop
- Control laboratory
- Diesel engines workshop
- Fluid mechanics laboratory
- Gasoline engines workshop
- Internal–combustion engines laboratory
- Pipes and valves workshop
- Pumps and compressors laboratory
- Pumps and compressors workshop
- Refrigeration and A/C Troubleshooting laboratory
- Refrigeration and Air–Conditioning equipment workshop
- Refrigeration laboratory
- Turbines and steam boilers laboratory
- Vibration and theory of machines laboratory

Department of Mechanical Power and Refrigeration Technology

Major: Mechanical Power Technology

Code: 0401–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
66	111	Statics and Strength of Materials	3	
66	112	Machine Elements	3	
66	120	Fundamentals of Fluid Mechanics	3	56–113
66	126	Measurements and Control Technology	2	
66	131	Fundamentals of Thermodynamics	3	76–105
66	180	Engines Workshop	3	
66	200	Field training (1) *	2	30–101
66	221	Fluid Machinery	3	66–120
66	230	Basics of Heat Transfer	3	
66	232	Power Stations	3	66–131
66	240	Internal Combustion Engines	3	66–131
66	281	Fluid Machinery Workshop	3	
66	285	Projects	2	66–221
63	290	Electricity for Mechanical Engineering	3	
66	291	Computer Applications	3	69–182
66	300	Field training (2) **	4	66–200
66	341	Steam and Gas Turbines	3	66–131
66	382	Mechanical Maintenance	2	66–281

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
66	182	Fuel and Lubricants	1	
66	212	Theory of Machines	3	66–112
66	213	Mechanical Vibrations	3	66–112
66	233	Heat Exchangers	3	66–230
63	236	Refrigeration and Air Conditioning	3	66–131
66	322	Hydraulics and Fluid Power	3	66–120
66	323	Piping technology	3	66–120
66	334	Desalination Technology	3	66–230
66	342	Industrial Pollution	3	66–240
66	384	Professional Comm. and Site Visits	2	30–101

Department of Mechanical Power and Refrigeration Technology

Major: Air Conditioning and Refrigeration Technology

Code: 0404–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
66	121	Applied Fluid Mechanics	3	
66	132	Engineering Thermodynamics	3	
63	140	Fundamentals of Refrigeration	3	
63	200	Field Training (1) *	2	30–101
66	231	Fundamentals of Heat Transfer	3	76–105
63	245	Refrigeration Systems	3	63–140
63	250	Fundamentals of Air conditioning	3	
63	255	Air Cond. and Distribution Systems	3	63–250
63	258	Basic Skills Workshop	2	
63	259	Electricity for HVAC and Refrigeration	3	56–113
63	261	Installations and Maintenance	3	63–258
63	262	Troubleshooting	3	63–259
63	271	Fund. of HVAC and Refrig. Control	3	
63	272	HVAC and Refrig. Control Systems	3	63–271
63	280	Air Cond. and Refrigeration Drafting	2	64–103
63	300	Field Training (2) **	4	63–200
63	335	Thermal Load Estimation	3	66–231
63	390	Computer Applications	2	63–255

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
63	109	Measurements Technology	3	
66	113	Statics	3	
63	225	Valves and Piping Technology	3	66–121
63	234	Heat Exchangers	3	66–231
63	235	Steam Generators and Heating Systems	3	66–132
63	246	Industrial Refrigeration	2	63–140
63	253	Chilled Water A/C Systems	3	63–250
63	263	Professional Comm. and Site Visits	2	
63	273	Control Applications	3	63–271
63	364	Projects	2	63–258

COURSE DESCRIPTION

Department of Mechanical Power and Refrigeration Technology

63–109 Measurements Technology

Credits: 3 Hrs.: 4

Generalized measurement systems: elements and applications, concepts of errors, accuracy, precision, sensitivity, and uncertainty analysis. Description and construction of measuring devices for flow, pressure, temperature, electrical quantities, and some other miscellaneous quantities. Laboratory experiments to demonstrate various aspects of measurements.

63–140 Fundamentals of Refrigeration

Credits: 3 Hrs.: 4

Basic definitions, applications, and methods of refrigeration, theoretical and actual vapor compression refrigeration cycles, analysis of simple vapor compression refrigeration cycle, effects of operating conditions, refrigerants, refrigerant characteristics, and components of refrigerating units. Laboratory experiments to explore principles of refrigeration.

63–200 Field Training (1)

Credits: 2 Hrs.: 8

Practical field training on different HVAC&R projects. The course includes installation of HVAC&R equipment, duct fabrication and installation, piping fabrication and installation, and maintenance and operation of HVAC&R systems.
Prerequisite: 30–101

63–225 Valves and Piping Technology

Credits: 3 Hrs.: 4

Basic principles of piping systems: piping layout, fluid flow in pipes, codes and standards for piping selection, material selection, components, and supports, piping fabrication, non–destructive testing, troubleshooting and maintenance of piping systems, valve types, construction, maintenance and applications. Practical training to gain experience for various aspects of valves and piping technology.
Prerequisite: 66–121

63–234 Heat Exchangers

Credits: 3 Hrs.: 4

Basics of heat exchangers: types, overall heat transfer coefficient, fouling resistance, enhancement surface factor, LMTD analysis method, effectiveness NTU method, pressure drop in heat exchangers, and performance and maintenance procedure of heat exchangers. Laboratory experiments to evaluate the performance of heat exchangers.
Prerequisite: 66–231

63–235 Steam Generators and Heating Systems

Credits: 3 Hrs.: 4

Heating systems in buildings; types, selection, operation and maintenance, pipe sizing and auxiliaries of heating systems. Boilers: types, construction, operation, maintenance, troubleshooting, and control. Laboratory experiments to demonstrate various aspects of boiler operation and maintenance.
Prerequisite: 66–132

63–236 Refrigeration and Air Conditioning

Credits: 3 Hrs.: 4

Refrigerant types and properties, refrigeration systems, simple vapor compression cycle, compound refrigeration systems, leak detection methods, Psychrometric air properties, human comfort standards, air conditioning processes, cooling load calculation and air conditioning systems. Laboratory experiments to demonstrate various aspects of refrigeration and air conditioning.
Prerequisite: 66–131

63–245 Refrigeration Systems

Credits: 3 Hrs.: 4

Vapor compression systems, multi–pressure vapor compression systems, multi–evaporators systems. Absorption, steam jet, air cycle, thermo–electric, and solar refrigeration systems. Food refrigeration processes. Laboratory experiments to explore different refrigeration systems and their performance.
Prerequisite: 63–140

63–246 Industrial Refrigeration

Credits: 2 Hrs.: 3

Industrial refrigeration systems and their applications: food processing, refrigeration process, and cold storage. Operation theories for different types of ammonia refrigeration systems. Performance of industrial refrigeration systems. Laboratory experiments to demonstrate various industrial refrigeration systems.
Prerequisite: 63–140

63–250 Fundamentals of Air Conditioning

Credits: 3 Hrs.: 4

Properties of moist air: specific humidity, humidity ratio, relative humidity, and enthalpy. Psychrometric chart. Air conditioning processes on psychrometric chart: heating, cooling, and humidification. Different types of air conditioning systems and equipment. Laboratory experiments for different air conditioning processes and equipment.

63–253 Chilled Water A/C Systems

Credits: 3 Hrs.: 4

Functions of chilled water system components. Theoretical and practical procedures of start–up, operation, and shutdown of chilled–water and heated–water central systems. Gas–fired and electrical boilers and their accessories. Maintenance and service programs for system components. Laboratory experiments for demonstration of chilled water system and components.
Prerequisite: 63–250

63–255 Air Conditioning and Distribution Systems

Credits: 3 Hrs.: 4

Types of air–conditioning systems, including components, functions, and their applications. Sizing of HVAC systems and selection of air and chilled water distribution components. Systems classification according to heating or cooling of the conditioned space or their specific purposes. Laboratory experiments for different air conditioning systems and air distribution systems.
Prerequisite: 63–250

63–258 Basic Skills Workshop

Credits: 2 Hrs.: 6

Safety regulations in workshop and service processes on HVAC&R systems. Practical training on: methods of recovery, recycle and reclaiming of refrigerants. Recognizing and using different types of refrigerant and their characteristics. Leak detection methods; and identifying and handling electrical wires types. Welding processes for HVAC&R tubing.

63–259 Electricity for HVAC and Refrigeration

Credits: 3 Hrs.: 4

Fundamentals of electricity and electronics to HVAC and Refrigeration systems. Concepts of alternating current and different HVAC&R electrical circuits. Relationship between current and voltage in simple circuits. Single– and three–phase induction motors, circuit protection devices, semiconductors, diodes, sensors, and integrated circuits (IC's). Laboratory experiments to explore principles of electricity.
Prerequisite: 56–113

63–261 Installations and Maintenance

Credits: 3 Hrs.: 7

Installation of residential and commercial HVAC&R systems. Installation of air distribution systems, electrical wiring, and piping work. Commissioning procedures and inspection check lists start–up and checkout procedures. System specifications and performance adjustment, maintenance procedures, mechanical and electrical services of domestic units. Troubleshooting analysis and repair. Laboratory experiments to demonstrate different aspects of installation and maintenance of HVAC&R systems.
Prerequisite: 63–258

63–262 Troubleshooting

Credits: 3 Hrs.: 4

Familiarization of different troubleshooting techniques. Steps to diagnose, analyze, and define the mechanical and electrical malfunctions of commercial HVAC&R. Fault detection methods and remedy procedures. Practical troubleshooting analysis of chilled water and hot water of central HVAC systems, commercial refrigeration systems, and their components. Laboratory experiments to demonstrate procedures of troubleshooting for different HVAC&R systems.
Prerequisite: 63–259

63–263 Professional Communication and Site Visits

Credits: 2 Hrs.: 4

The use of professional communication language; early stages of writing, generating ideas, identifying audiences and purposes, constructing arguments, and stating problems; models of good writing; procedures for oral presentations; field visits to some of the industrial based HVAC&R services sites. Workshop training to practice oral presentation and written communication.

63–271 Fundamentals of HVAC&R Control

Credits: 3 Hrs.: 4

Fundamentals of control theory, including feedback control system, closed and open loops; block diagrams and their components. Control modes, control classification and performance; sensors and controllers for temperature, pressure, humidity, flow, and level; controlled devices and auxiliary control components. Laboratory experiments to explore the fundamentals of control for different HVAC&R systems.

63–272 HVAC and Refrigeration Control Systems

Credits: 3 Hrs.: 4

Reciprocating compressor control; centrifugal composer control; rotary and screw compressor capacity control. Air handling unit control: humidity and reheat control; VAV system and constant volume variable temperature systems control. Commercial refrigeration and defrost control methods**.** Laboratory experiments to demonstrate the control systems for different HVAC&R systems.
Prerequisite: 63–271

63–273 Control Applications

Credits: 3 Hrs.: 4

Different aspects of constructing electrical and pneumatic control circuits for HVAC applications; air– and water–cooled reciprocating and centrifugal chilled water plants, heating systems. Commercial refrigeration control and some special control systems; reduced voltage starters and electronics for HVAC. Energy management and building automation systems.
Prerequisite: 63–271

63–280 Air Conditioning and Refrigeration Drafting

Credits: 2 Hrs.: 4

Drafting of HVAC& R symbols, development of A/C duct reading of architectural drawing, laying duct system on architectural drawing, and laying piping system and A/C equipment (plant room). Use of computer drafting software for simple applications.
Prerequisite: 64–103

63–290 Electricity for Mechanical Engineering

Credits: 3 Hrs.: 4

Simple circuit construction and measurements. Ohm's law, DC and AC circuits, Single–phase and three–phase electricity. Devices and components; DC and AC generators, motors, transformers, electric current protection, and plant electrical distribution systems. Operation and application of electrical devices. Laboratory experiments to explore principles of electricity.

63–300 Field Training (2)

Credits: 4 Hrs.: 16

Practical field training on different HVAC&R projects. Training on maintenance and operation of central air– conditioning stations, design, heat load estimation, control system, and troubleshooting of HVAC&R systems. The supervision practice of HVAC&R project erection and manpower distribution.
Prerequisite: 63–200

63–335 Thermal Load Estimation

Credits: 3 Hrs.: 4

Human thermal comfort, design conditions, heating load estimation, cooling load estimation, design variables, internal and external sources for building thermal load, and HVAC system sizing.
Prerequisite: 66–231

63–364 Projects

Credits: 2 Hrs.: 4

Practical and/or theoretical approach to treat a certain problem related to HVAC and refrigeration applications and to find the suitable solution. This includes load estimation, analysis, sizing, planning, scheduling and execution, and fabrication of the project.
Prerequisite: 63–258

63–390 Computer Applications

Credits: 2 Hrs.: 4

Computer applications in heat transfer, thermodynamics, fluid mechanics and others. Computer drafting using Auto CAD of A/C and Refrigeration symbols, A/C ducts, ducts layout, piping systems, A/C equipment, and wiring circuits, Duct and piping sizing, psychrometric chart are practiced using special computer software.
Prerequisite: 63–255

66–111 Statics and Strength of Materials

Credits: 3 Hrs.: 4

Force analysis and mechanics of materials, properties of concurrent force systems and equilibrium of a particle, principles of rigid body equilibrium, center of gravity of simple and composed areas, shear stress and bending stress, stress and strain in axial, and torsion and beam bending.

66–112 Machine Elements

Credits: 3 Hrs.: 4

The machine elements that are part of mechanical power transmission: shafts, gears, belt drives, keys, couplings, seals, rolling bearings, brakes, clutches, fasteners, power screws, welds, springs, governors, and flywheels.

66–113 Statics

Credits: 3 Hrs.: 4

An introduction to mechanics, notation of a vector, properties of concurrent force systems, equilibrium of a particle, principles of rigid body equilibrium, and center of gravity of simple and composite areas. Shearing force and bending moment applications.

66–120 Fundamentals of Fluid Mechanics

Credits: 3 Hrs.: 4

Fluid mechanics fundamentals and applications, fluid properties, fluid static, manometers, pressure gauges, classification of fluid flow, conservation of mass, Bernoulli's equation, viscous flow in pipes, and pipe systems. Laboratory experiments to explore principles of fluid mechanics and their applications.
Prerequisite: 56–113

66–121 Applied Fluid Mechanics

Credits: 3 Hrs.: 4

Physical properties of fluids, principle of hydrostatics, pressure and its measuring devices, fluid motion, continuity equation, Bernoulli's equation and its applications, compressible and incompressible flows. Pressure drops through conduits, fittings, valves, nozzles, diffusers, friction and friction factor charts. Laboratory experiments to demonstrate the principles of fluid mechanics and its applications.

66–126 Measurements and Control Technology

Credits: 2 Hrs.: 3

Fundamentals and practical issues in the fields of measurements and control, characteristics of measuring devices and control systems, modern and conventional measuring devices, temperature, flow rate, pressure, level, speed and position control, and examples of practical control systems. Laboratory experiments to explore principles of measurements and control.

66–131 Fundamentals of Thermodynamics

Credits: 3 Hrs.: 4

Basic concepts and definitions, phase change processes of pure substances, steam property tables, ideal gas laws and processes. The first law of thermodynamics and its application to closed and open systems. The second law of thermodynamics; Carnot principles and entropy. Laboratory experiments to explore the principles of thermodynamics.
Prerequisite: 76–105

66–132 Engineering Thermodynamics

Credits: 3 Hrs.: 4

Engineering dimensions and units, phase diagrams and tables, ideal gas relations, first law of thermodynamics and its applications for open and closed systems, second law of thermodynamics, reversibility, Carnot cycle principle, and entropy. Laboratory experiments to explore the principles of thermodynamics.

66–180 Engines Workshop

Credits: 3 Hrs.: 7

Comprehensive practical training on spark ignition and compression ignition engines. Engine dismantling, recognition, inspection of parts, and engine reassembly. Diagnosis and finding of the most common faults.

66–182 Fuels and Lubricants

Credits: 1 Hrs.: 1

Fuels: Classification, petroleum and non–petroleum fuels, fuel properties, fuel additives and standard tests, and the evolution of petroleum in liquid and gaseous forms.
Lubricants: Classification, petroleum and synthetic oils, lubrication functions, properties of lubricants, additives, lubricant analysis, standard tests, lubrication of engines and industrial machinery.

66–200 Field Training (1)

Credits: 2 Hrs.: 8

Practical training for a period of seven weeks in a facility work environment related to the student major: power stations, petroleum industries, or central workshops. Emphasis is laid on the application of science knowledge and technical skills acquired by the student through his/her first year and safety regulations.
Prerequisite: 30–101

66–212 Theory of Machines

Credits: 3 Hrs.: 4

Kinematics of machines, relative motion, types of kinematics chains and mobility. simple and complex mechanisms, balancing of rotating masses, balancing of single and multicylinder engines, application for cams, and construction of cam profiles with roller, knife–edge follower, and flat–faced follower. Laboratory experiments to demonstrate various aspects for theory of machines.
Prerequisite: 66–112

66–213 Mechanical Vibrations

Credits: 3 Hrs.: 4

Physical phenomena of vibration; free and forced vibrations; response of massless shafts to unbalance forces; sources of vibration in rotating machines; and rotating machinery vibration and its measurements. Laboratory experiments to demonstrate various aspects of mechanical vibrations.
Prerequisite: 66–112

66–221 Fluid Machinery

Credits: 3 Hrs.: 4

Theory and practical aspects of fluid machinery (pumps and compressors) and their applications. Types of pumps and compressors, operating principles, applications, advantages and disadvantages, construction of pumps and compressors, phenomena associated with their operations, and flow regulations. Laboratory experiments to demonstrate types and components of pumps and compressors.
Prerequisite: 66–120

66–230 Basics of Heat Transfer

Credits: 3 Hrs.: 4

Basic modes of heat transfer, one–dimensional conduction, thermal–electrical analogy, thermal insulation, finned surfaces, theoretical relations and empirical correlations of both free and forced convection, radiation and heat exchangers. Laboratory experiments to explore principles of heat transfer.

66–231 Fundamentals of Heat Transfer

Credits: 3 Hrs.: 4

Basic modes of heat transmission through different types of media such as solids and fluids; heat transmission applications; heat exchanger applications and selection. Laboratory experiments to explore different modes of heat transfer.
Prerequisite: 76–105

66–232 Power Stations

Credits: 3 Hrs.: 4

Steam power plant, simple Rankine cycle with its modifications, steam generators, feed water heaters, and steam condenser. Experimenting the performance of steam power plant components. Laboratory experiments for power cycles and steam boiler.
Prerequisite: 66–131

66–233 Heat Exchangers

Credits: 3 Hrs.: 4

Basic concepts of heat exchangers, heat exchanger types, overall heat transfer coefficient, fouling resistance, enhancement surface factor, LMTD analysis method, effectiveness–NTU method, pressure drop in heat exchangers, performance, and maintenance procedure of heat exchangers. Laboratory experiments to evaluate the performance of heat exchangers.
Prerequisite: 66–230

66–240 Internal Combustion Engines

Credits: 3 Hrs.: 4

Ideal cycles for spark ignition and compression ignition engines, engine testing and performance, fuel, cooling and lubrication systems in spark ignition and compression ignition engines, combustion processes, types of combustion chambers, power boosting and scavenging methods. Laboratory experiments to evaluate performance of internal combustion engines.
Prerequisite: 66–131

66–281 Fluid Machinery Workshop

Credits: 3 Hrs.: 7

Practical training for operation and maintenance of fluid machinery equipment (pumps and compressors). Pump maintenance and troubleshooting; piping systems, including piping and valve standards. Materials, pipe fabrication, and piping system construction; and maintenance of reciprocating compressor and centrifugal compressor.

66–285 Projects

Credits: 2 Hrs.: 6

Practical and/or theoretical approaches to treat a certain problem related to mechanical system or mechanical equipment and to find the suitable solution.
Prerequisite: 66–221

66–291 Computer Applications

Credits: 3 Hrs.: 6

Use of computer programs to solve engineering problems in statics, thermodynamics, fluid mechanics, heat transfer, machine elements, and maintenance; and the use of computer–aided drafting programs (such as AutoCAD) in two–dimensional engineering drawings.
Prerequisite: 69–182

66–300 Field Training (2)

Credits: 4 Hrs.: 16

Practical training for a period of fifteen weeks in a facility related to the student major such as power stations, petroleum industries, or central workshops. Emphasis is laid on operation, maintenance, and control of technical systems, equipment setup, commissioning, and calibration (or installation), and safety and environment.
Prerequisite: 66–200

66–322 Hydraulic and Fluid Power

Credits: 3 Hrs.: 4

Basic knowledge for using fluids in transmitting power, components of fluid power systems: pumps, cylinders, motors, seals, packing and control valve. Troubleshooting and maintenance of fluid power systems. Laboratory experiments to demonstrate various mechanisms and evaluate performance of hydraulic and pneumatic systems.
Prerequisite: 66–120

66–323 Piping Technology

Credits: 3 Hrs.: 4

Basic principles of piping systems; piping layout, fluid flow in pipes, codes and standards for piping selection, material selection for piping, components, and supports. Piping fabrication; non–destructive testing, troubleshooting, and maintenance of piping systems. Practical training for various aspects of piping technology.
Prerequisite: 66–120

66–334 Desalination Technology

Credits: 3 Hrs.: 4

Properties of seawater, scale formation and prevention, desalination processes, single– and multi–effect boiling desalting systems, multistage flash desalination systems, reverse osmosis systems, vapour compression systems, and other secondary desalination methods.
Prerequisite: 66–230

66–341 Steam and Gas Turbines

Credits: 3 Hrs.: 4

Steam and gas turbines: types, constructions, and thermodynamic cycles. Gas turbine engine: fundamental, basic system and performance. Maintenance of steam and gas turbine plants. Laboratory experiments for steam and gas turbines.
Prerequisite: 66–131

66–342 Industrial Pollution

Credits: 3 Hrs.: 3

Types and sources of pollution, air pollution, water pollution, and soil pollution. General concepts of pollution control. Pollution from power plants and oil refineries, pollution from automobiles, pollution control equipment for power plants, oil refineries and automobiles, domestic and industrial wastewater treatment, and noise pollution and the applied controlling techniques.
Prerequisite: 66–240

66–382 Mechanical Maintenance

Credits: 2 Hrs.: 3

Fundamentals of maintenance, organization, and management: planning, scheduling, automation, and techniques for improving the maintenance of specific plants. Maintenance fundamentals: equipment inspection, troubleshooting, lubrication, alignment, and the essential technical aspects of equipment monitoring.
Prerequisite: 66–281

66–384 Professional Communication and Site Visits

Credits: 2 Hrs.: 4

The use of professional communication language; early stages of writing, generating ideas, identifying audiences and purposes, constructing arguments, and stating problems; models of good writing; and procedures for oral presentations. Field visits to some of the sites of industry–based power services. Workshop training to practice oral presentation and written communication.
Prerequisite: 30–101

Department of Petroleum Engineering Technology

Overview:

The College of Technological Studies has designed this program to prepare high school graduates to 66–t these requirements upon the successful completion of the program. The Petroleum Technology Program includes two specializations: one is exploration and development and the other is production and Export. The first aims to graduate assistant engineers in the exploration and development area, whereas the second aims to graduate them to work in the production areas. The primary objective of the Petroleum Engineering Technology Curriculum is to provide the student with sufficient science fundamentals, laboratory, and practical experience in order to work as a qualified technician in oil and gas producing and service companies.

Majors:

The department offers two areas of specialization:

- Petroleum Engineering Technology–Exploration and Development
- Petroleum Engineering Technology–Production and Export

Laboratories:

- Computer Lab
- Core preparation
- Corrosion
- Drilling Fluids
- Drilling Simulation
- Fluid Properties
- Petroleum Cementing
- Physical and Petroleum Geology
- Production
- PVT
- Routine Core Analyses
- Special core analyses

Department of Petroleum Engineering Technology

Major: Petroleum Engineering Technology–Exploration and Development

Code: 0461–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
78	102	Introduction to Petroleum Engineering	1	
63	115	Thermodynamics	3	
79	121	Physical Geology	3	
79	131	Reservoir Rock Properties	3	
75	142	Basic Chemistry	3	
66	152	Fluid Mechanics	3	
79	201	Field Training (1) *	2	
78	212	Petroleum Engineering Calculation	2	76–105
79	222	Petroleum Geology	3	79–121
79	232	Reservoir Fluid Properties	3	76–106, 79–131
79	235	Formation Evaluation	3	76–106
79	236	Reservoir Engineering Technology	3	79–232
79	241	Drilling and Well Completion	3	79–131
79	243	Well Control	3	79–241
79	244	Water Injection Operations	3	79–236
79	301	Field Training (2) **	4	79–201
79	342	Well Testing Technology	3	79–236
79	392	Computer Appl. in Petroleum Eng.	3	79–232

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
78	214	Safety in Petroleum Facilities	3	
78	279	Artificial Lift Technology	3	79–241
79	299	Project	3	78–212
78	353	Production Design and Operation	3	78–212
79	357	Petroleum Economics	3	78–212

Department of Petroleum Engineering Technology

Major: Petroleum Engineering Technology–Production and Export

Code: 0462–DP

1. Major Core Courses

(51) Credits

Code	No.	Course Name	Credits	Prerequisite
78	102	Introduction to Petroleum Engineering	1	
78	112	Corrosion in Petrol Facilities	3	
63	115	Thermodynamics	3	
79	121	Physical Geology	3	
79	131	Reservoir Rock Properties	3	
75	142	Basic Chemistry	3	
66	152	Fluid Mechanics	3	
78	201	Field Training (1) *	2	
78	212	Petroleum Engineering Calculations	2	76–105
79	232	Reservoir Fluid Properties	3	76–106, 79–131
78	240	Basic Instrumentation	3	56–113, 78–212
79	241	Drilling and Well Completion	3	79–131
78	251	Petroleum Production Operation	3	79–232
78	255	Well Performance	3	79–241
78	257	Natural Gas Technology	3	79–232
78	301	Field Training (2) **	4	78–201
78	372	Transportation and Storage	3	79–232
79	392	Computer Appl. in Petroleum Eng.	3	79–232

* Passing 29 credits is required to register this course.
** Registering in 50 major credits is required to register this course.

2. Major Elective Courses

(6) Credits

Code	No.	Course Name	Credits	Prerequisite
78	214	Safety in Petroleum Facilities	3	
78	279	Artificial Lift Technology	3	79–241
78	299	Project	3	78–212
78	353	Production Design and Operation	3	78–212
79	357	Petroleum Economics	3	78–212

COURSE DESCRIPTION

Department of Petroleum Engineering Technology

78–102 Introduction to Petroleum Engineering

Credits: 1 Hrs.: 1

Overview of petroleum industry and petroleum engineering, including nature of oil and gas reservoirs, petroleum exploration and drilling, formation evaluation, completion and production, surface facilities, reservoir mechanics, and improved oil recovery.

78–112 Corrosion in Petroleum Facilities

Credits: 3 Hrs.: 4

Theories and principles of corrosion and prevention. Inspection, welding problems, and application of corrosion prevention in petroleum production facilities.

78–201 Field Training (1)

Credits: 2 Hrs.: 8

Training in one or more of petroleum production and export facilities. Study of the equipment used, process, safety, and technical problems and their solutions.

78–212 Petroleum Engineering Calculations

Credits: 2 Hrs.: 3

Basic physical and chemical concepts, stoichiometry mixture of gases, vapors ,and liquids in addition to simple material balance concepts and energy balances for simple system. Application in petroleum production, transportation, and storage facilities are also included.
Prerequisite: 76–105

78–214 Safety in Petroleum Facilities

Credits: 3 Hrs.: 4

Health, safety, and environment issues: test for hazardous atmosphere, safety in handling equipment, hazardous material in oil industry, chemical storage, H_2S awareness, pollution, fire emergency in oil industry, and rules and regulations.

78–240 Basic Instrumentation

Credits: 3 Hrs.: 4

Fundamentals of common measurement and control systems functions of pneumatic and electronic process instruments, tuning parameters of a process controller, application of process control instruments for environmental monitoring in the oil and gas industry, and instrument calibration procedures.
Prerequisite: 56–113, 78–212

78–251 Petroleum Production Operation

Credits: 3 Hrs.: 4

Gathering and separation of gas, oil, and water; types of separators and configuration; dehydration and desalting principles; and heaters and heat exchangers. The calculation and simulation of flow in pipes, such as well bore and flow lines, will be covered using computer approach.
Prerequisite: 79–232

78–255 Well Performance

Credits: 3 Hrs.: 3

Elements of producing wells, inflow performance for oil and gas wells, and single and multiphase flow in vertical and horizontal pipes. Choke performance. Well head separator and fluid treatment systems. Systems approach to well performance analysis. It also covers well performance using nodal analysis. Production decline analysis. Introduction to artificial lift systems.
Prerequisite: 79–241

78–257 Natural Gas Technology

Credits: 3 Hrs.: 4

Gas physical properties, vertical flow performance of gas wells, and absolute open flow potential. Gas transmission applications, Panhandle equation and gas pipelines. Static and dynamic flowing bottom hole pressures using the ATC and Cullender and Smith methods. Gas dehydration, sweetening, and gas metering.
Prerequisite: 79–232

78–279 Artificial Lift Technology

Credits: 3 Hrs.: 3

A review of IPR, flow in the well bore, flow in the flow line, improving well performance by decreasing flowing bottom pressure requirements, increasing well production by using artificial lift systems, gas lift, electrical submersible pumps (ESP), jet and hydraulic pumps, and beam pumps.
Prerequisite: 79–241

78–299 Project

Credits: 3 Hrs.: 4

This course is designed for a student or group of students to apply their petroleum engineering knowledge to study a specific problem in production and export. The tasks are performed under an instructor's supervision and usually carried out in the laboratory or by using a computer.
Prerequisite: 78–212

78–301 Field Training (2)

Credits: 4 Hrs.: 16

Advanced training in some units in the field of petroleum production and export facilities with emphasis on well corrosion surface flow line, gathering center facilities, wire line tools and its evaluation, drilling, crude oil transportation and storage, and well performance.
Prerequisite: 78–201

78–353 Production Design and Operation

Credits: 3 Hrs.: 4

Factors involved in material utilization, equipment design, and construction of pressure vessels, pumps, compressors, and turbines. HYSIM or similar software will be used to design surface facilities.
Prerequisite: 78–212

78–372 Transportation and Storage

Credits: 3 Hrs.: 3

Oil and gas storage: pipeline transportation of oil and gas, leaks and ruptures in pipeline, storage tanks and their types, material of construction, and the effect of temperature and pressure on pipelines.
Prerequisite: 79–232

79–121 Physical Geology

Credits: 3 Hrs.: 4

A study of the physical processes that operate on and within the Earth and determine its evolution through geologic time. The course covers geologic time; structure of the earth; minerals; igneous, sedimentary, and metamorphic rocks; structural geology; and plate tectonics.

79–131 Reservoir Rock Properties

Credits: 3 Hrs.: 4

Properties of reservoir rocks, porosity, fluid flow through reservoir rocks and permeability, capillary phenomena, and electrical properties of reservoir rocks. The rock properties are also determined in the laboratory.

79–201 Field Training (1)

Credits: 2 Hrs.: 8

Training in one or more petroleum exploration and development facilities. Study of exploration techniques, well developments, and computer application in petroleum engineering.

79–222 Petroleum Geology

Credits: 3 Hrs.: 4

A study of sedimentology and stratigraphy in the context of petroleum geology, geologic history of Kuwait sedimentary basins, paleontology, reservoir rocks origin and migration of petroleum, trapping mechanisms, and preparation of maps and cross sections. Basic methods of studying rocks in the subsurface will be introduced.
Prerequisite: 79–121

79–232 Reservoir Fluid Properties

Credits: 3 Hrs.: 4

Physical principles of petroleum engineering, dimensional analysis, compositional parameters for mixtures, fundamental gas laws, elementary phase behavior equilibrium vaporization ratios, and critical conditions. A fluid properties laboratory is an integral part of the course, where some of the physical properties are determined.
Prerequisite: 76–106, 79–131

79–235 Formation Evaluation

Credits: 3 Hrs.: 3

The qualitative and quantitative interpretation of well logging techniques as applied to formation analysis. The topics cover field examples and problems.
Prerequisite: 76–106

79–236 Reservoir Engineering Technology

Credits: 3 Hrs.: 3

Description and classification of natural underground oil and gas reservoirs. Fluid flow in porous media, reservoir energy and producing mechanism; application of material balance in reservoir performance calculations.
Prerequisite: 79–232

79–241 Drilling and Well Completion

Credits: 3 Hrs.: 4

Introduction to drilling systems: functions and design considerations of rotating system, hoisting system, and circulation system; drilling fluids calculation and selections; hydraulic programs; casing and well cementing, and pressure control.
Prerequisite: 79–131

79–243 Well Control

Credits: 3 Hrs.: 4

Formation pressures, kick signs, well control methods, leak off test, and understanding of kill sheet in well control operations. Well control equipment, and discussion actual problems encountered during well control operations.
Prerequisite: 79–241

79–244 Water Injection Operations

Credits: 3 Hrs.: 4

Practical reservoir engineering aspects of water injection operations. Basic principles and requirements of successful water injection programs. One of the major topics to be taught in the course is the frontal advance theory with some reservoir applications.
Prerequisite: 79–236

79–299 Project

Credits: 3 Hrs.: 4

This course is designed for a student or group of students to apply their petroleum engineering knowledge to study a specific problem in exploration and development. The tasks are performed under an instructor's supervision and usually carried out in the laboratory or by using a computer.
Prerequisite: 78–212

79–301 Field Training (2)

Credits: 4 Hrs.: 16

Advanced training in some units in the field of petroleum exploration and development with emphasis on exploration technique, design drilling and well completion, well development (reservoir engineering analysis), well performance, and computer application in petroleum engineering.
Prerequisite: 79–201

79–342 Well Testing Technology

Credits: 3 Hrs.: 4

Purpose of testing oil and gas wells, tools employed, planning of tests, drill steam tests, production tests, flow tests, drawdown tests and build up tests, evaluation of wells using production logging, and test interpretation. Application of the well testing results for evaluation of well performance.
Prerequisite: 79–236

79–357 Petroleum Economics

Credits: 3 Hrs.: 3

Time value of money such as present and future value, the effect of interest and discount rates on these values, cash flow analyses, and project financing. Economic indicators such as profit, net present value (NPV), internal rate of return, and payout time will also be addressed. Uncertainty and risk, taxes and royalties and their effect will also be covered.
Prerequisite: 78–212

79–392 Computer Application in Petroleum Engineering

Credits: 3 Hrs.: 4

Various computer applications in the petroleum field. Operating systems in terms of working in the UNIX environment. Preparing a model in terms of importing and exporting files through different computer operating systems and running the model through a simulator.
Prerequisite: 79–232

Courses offered by College of Basic Education (CBE)

01–101 Islamic Culture

Credits: 2 Hrs.: 2

The impact of Islam on Arabic culture, cultural meaning of Islamic rules, and tradition of early Islamic communities.

03–112 Work Ethics and Loyalty

Credits: 3 Hrs.: 3

Basic concepts. Aims and goals of work. National and foreign values of work and loyalty. Social and psychological aspects of work. Defects of job environment on performance and loyalty. Steps taken to face problems on work sites.

07–141 Art Education (1)

Credits: 1 Hrs.: 2

The arts. Human expressions in arts. Performance, applied arts, sketching, the use of paints, pottery, enamels, and wood working.

07–142 Art Education (2)

Credits: 1 Hrs.: 2

Harmony of colors, theory of colors, practices in mixing, raw material handling, and appreciation of fine art.
Prerequisite: 07–141

08–110 Physical Education

Credits: 1 Hrs.: 2

The human body as a successful structure. Mechanical features of the human body, games and muscle development, and games and group action.

10–104 Research and Libraries

Credits: 1 Hrs.: 2

Types of libraries. Role of libraries: educational, informative, cultural, and social. Library dimensions. Different types of information resources (Arabic and foreign). Basics of evaluation of information resources. Research methodology. Information extraction, collection, and organization. Essay writing techniques. Significance of children literature.

13–151 Music Education (1)

Credits: 1 Hrs.: 2

The course aims to promote music appreciation, orients students in the basic language of music in the context of his/her culture. Music instruments, basic instructions on harmony, tone, overtones, fundamentals of orchestral music, and characteristics of master pieces.

15–114 Industrial Psychology

Credits: 2 Hrs.: 2

Introduction to psychology, motivation and behavior, anxieties and behavior, introduction to industrial psychology, individual differences in industry, acceptability between individuals and work, work analysis, industrial training, accidents in industry and safety, fatigue in industry, and human industry relations.

Courses offered by College of Business Studies (CBS)

21–164 Accounting

Credits: 2 Hrs.: 2

Definition of accounting. Accounting branches, registration of financial operations, registration, account books, and registers. Classification of financial operations, forwarding, auditing balance, and account types. Project assessment, project budget, stationary assets, mobile assets, expenditure, and income.

22–104 Small Project Development and Management

Credits: 2 Hrs.: 2

Definition, criteria, forms, and characteristics of small projects. Pioneering. Foundation and implementation. Factors of success and failure. Planning and organization of small projects. Decision making, counseling and leadership, and supervision. Management of human resources. Financial and marketing management. Feasibility study and credit and revenue systems.

25–166 Industrial Economics

Credits: 2 Hrs.: 2

Definitions, economic problem, and production possibility frontier. Demand and supply and market equilibrium. Elasticity and industrial projection. Theory of production. Cost, revenue, and market structures. Economic visibility. Industry in Kuwait.

30–099 English Language (Intensive)

Credits: 0 Hrs.: 6

Level 1 – This is a pre–intermediate course that aims to build on existing knowledge of vocabulary and grammar and to expand student's oral/aural skills in English. This is a remedial course for those students who could not pass the English placement test administered upon admission to the college system of PAAET.

30–101 English Language (1)

Credits: 3 Hrs.: 5

Level 2 – This is a 5–contact hour intermediate level course that aims to build on existing knowledge of vocabulary and grammar and to expand student's oral/aural skills in English. The Prerequisite is either passing the EPT exam or remedial course 099. This is a general English course offered at all five colleges of PAAET which include technological, Nursing, Health, and Business studies as well as the college of basic education.

30–170 English Language (2)

Credits: 3 Hrs.: 5

Level 3 – This is a 5contact hour high–intermediate course that aims to build on existing knowledge of vocabulary and grammar and to expand students' oral/aural skills in English. This 3rd level generally technical integrated skills course aims at equipping the students of CTS with the language proficiency they need to perform adequately at their respective workplaces. It focuses on writing and ensures the acquisition of writing competencies such as email, memos, and short technical reports. Reading technical material and processing it through summary is also an objective. On the speech level, this course will train the students in everyday English skills such as handling telephone calls and it will provide them with the confidence and structure needed to deliver effective short presentations, an oral skill that is becoming increasingly recognized as the highest standard of communicative ability in English.

CTS

College of Technological Studies
Campus Map

01	College Administration
02	Dean & Assistant Deans
03	Workshop and Lecture rooms
04	Manufacturing Engineering Technology Department
05	Computer Laboratories and Lecture rooms
06	Petroleum Engineering Technology Department
07	Chemical Engineering Technology Department
08	Electronic Engineering Technology Department
09	Civil Engineering Technology Department
10	Civil Engineering Laboratories
11	College Library
12	Student Cafeteria
13	Book Store
16	Storages
17	Cooling Towers
19	Mosque
20	Laboratories Technology Department
22	Electrical Engineering Technology Department
23	Mechanical Power and A/C Eng. Technology Department
	College Buildings
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