E-JUST

الجامعة المصرية اليابانية للعلوم والتكنولوجيا

エジプト日本科学 技術大学

تأسست بالقرار الجمهوري رقم 149 الصادر فى 30 مايو 2009

EGYPT-JAPAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

E-JUST

ENVIRONMENTAL ENGINEERING PROGRAM (ENV)

BYLAWS, CURRICULUM AND COURSE OUTLINES

MARCH 2020
ALEXANDRIA, EGYPT

School of Energy, Environment and Chemical Engineering

EECE

Contents

EGYPT-JAPAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (E-JUST)

HISTORY OF THE EGYPT-JAPAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

Egypt-Japan University of Science and Technology (E-JUST) is a research oriented university with the ambition to cultivate an academic environment and become a benchmark for the Egyptian and African countries in education. It was established based on a bilateral agreement between the Egyptian and Japanese governments in May 2009 and later in 2010 it was ready to accept its first batch of graduate students and make the dream a reality.

Both governments have a strong relation where they both divide the cooperation cohesively to ensure positive results. The Japan International Cooperation Agency (JICA) fully supports EJUST by sending their administrative and academic experts for assisting and guiding in the technical and management system of the university, as well as sending academic experts from the Japanese Supporting University Consortium (JSUC) to support in teaching, conduct join research and co-supervising the graduate students. In addition JICA provides state of the art equipment and tools for education and research purposes. As for the Egyptian government, it fully supports the university needs from capital and operating expenses.

All decisions that govern the university are done through its Board of Trustees (BOT) members whom are composed of 15 prominent figures from Egypt and Japan. They represent stakeholders from the government, academic and industrial field from both countries.

E-JUST AS A ROLE MODEL FOR HIGHER EDUCATION IN EGYPT

The vision of E-JUST is to become a role model for higher education and research institutions in Egypt by fostering the Japanese educational standards, policies, and systems. The Faculty of Engineering and Applied Sciences in “Egypt-Japan University of Science and Technology“, in its first phase, consisted of three engineering schools with a total of eight interdisciplinary departments including mechatronics and robotics engineering, industrial engineering and systems management, chemical and petrochemicals engineering, energy resources engineering, environmental engineering, materials science and engineering, electronics and communication engineering and computer science and engineering. E-JUST has established links for collaboration with a consortium of 12 Japanese academic institutions, in addition to several industrial companies in Japan and Egypt. By providing research oriented education, founded on *Active Experimental Learning methodology* by merging and integrating “Laboratory Based Learning”,” Project Based Learning” and ” Problem Based learning”, E-JUST aims to reach a status of international recognition.

The innovative platform for education and research at E-JUST is established with the partnership with Japanese supporting universities to conduct advanced education and research in the interdisciplinary graduate and undergraduate programs. The university has been pioneering new interdisciplinary fields for providing technologies required to create a sustainable society in Egypt, Africa, and the Middle East.

The partnership with Japanese universities and the internship of Egyptian students in research laboratories of Japanese counterpart universities make E-JUST graduates enjoy international status in education and research.

E-JUST model is anticipated to lead institutions towards unifying their specialized programs which encourage internationalization of higher education in the near future, and to enable credit transfer and students' mobility, making the best use of the most successful practices to award Joint degrees and dual degrees.

E-JUST VISION

To be a world class university in science and technology based on best Japanese higher education practices.

E-JUST MISSION

- To become a role model university for higher education, research and innovation in Egypt by adapting the Japanese educational standards, policies, and systems.
- To achieve international recognition of E-JUST academic degrees.
- To enhance and improve the human resources in Egypt and the region through Japanese style active experimental learning.
- To foster innovation based economy in Egypt, the Arab World, Africa and the Middle East.

E-JUST OBJECTIVES

- To introduce new and advanced interdisciplinary academic programs.
- To establish Centers of Excellence for basic and applied research related to community, industry and the environment.
- To promote multidisciplinary team work experience.
- To build partnerships with key Japanese academic and research institutions as well as industrial companies with the objective of directly exposing its students and staff to Japanese systems, know-how and technology.

- To build strong interaction mechanisms with the local and regional industries.
- To build partnerships with key Japanese industrial companies with the objective of conducting applied research, exposing the students and faculty to real life research activities, and getting acquainted with the Japanese systems know how and technology.
- To be ranked within the top international universities within 10 years.
- To reach international recognition for all academic degrees awarded to E-JUST graduates.

OVERVIEW ON ENGINEERING AS A PROFESSION

The term *engineering* has been derived from the word *engineer*, which itself dates back to 1325, when an *engineer* (literally, one who operates an *engine*) originally referred to "a constructor of military engines." Today the word "engineer" refers to the one who is known to create and apply technology and apply scientific laws and theories in an optimal and safe way. Engineers develop new technological solutions to existing problems. Engineers apply techniques of engineering analysis in testing, production, or maintenance. Analytical engineers may supervise production in factories and elsewhere, determine the causes of a process failure, and test output to maintain quality. They also estimate the time and cost required to complete projects. Supervisory engineers are responsible for major components or entire projects. Engineering analysis involves the application of scientific analytic principles and processes to reveal the properties and state of the system, device or mechanism under study. Engineering analysis proceeds by separating the engineering design into the mechanisms of operation or failure, analyzing or estimating each component of the operation or failure mechanism in isolation, and re-combining the components. They may analyze risk. Engineering tasks involve design, manufacture, construct, assemble, operate and provide maintenance of systems, components and devices.

Engineering programs include but not limited to Electrical, Mechanical, and Chemical Engineering. These programs include Electronics, Communications, Computer Science and Engineering, Electrical Power Engineering, Industrial and Manufacturing Engineering, Mechatronics Engineering, Materials Science and Engineering, Chemical and Petrochemical Engineering, and Energy Resources Engineering.

During their study, undergraduate engineering students receive field training in factories, establishments and industrial facilities. This allows them to link their study with real life problems. When an engineer starts his/her career, he/she is expected to be responsible, committed to his work, and do it in the best way he/she can, and he/she will develop a sense of responsibility for the tools, equipment and facilities.

Graduation will not be the end of training; an engineer will have to keep up with technical advances. This may be done by attending in-plant classes, advanced studies or pursue graduate studies.

ENGINEERING EDUCATION IN EGYPT

The beginning of modern engineering education in Egypt started back to 1816 when Mohamed Ali Pasha established "Madrasat El Mohandes Khana". In 1916 the school started to offer specialized studies in the final two years in five departments: Irrigation, Architecture, Municipal, Mechanical and Electrical Engineering. In 1935 the Royal School of Engineering was renamed as the Faculty of Engineering. It remained the sole Faculty of Engineering in Egypt until the creation of the Faculty of Engineering of Alexandria University in 1942. After 1952 revolution, Egypt witnessed intensive industrialization. As a result, from the 1950s to the 1970s, the technical education offered at higher technical institutes was transformed into a university education.

New curricula supplemented an existing focus on workshop experience with a new emphasis on micro-specialization brought from the Soviet Union. In 1950 the Higher Institute of Applied Engineering, which was supposed to train technicians, became another faculty of engineering at Ain Shams University. In 1957 Assiut University was established as the first university in Upper Egypt to prepare highly qualified graduates with the basic specialized Engineering such as Agriculture Engineering. In the 1970s Helwan Technical Institute, funded by West Germany, became the Faculty of Engineering at Helwan University and an Engineering Institute, first created in Shubra (Cairo) was integrated into the University of Zagazig at Behna. Now it belongs to Benha University.

Many Universities started as part of mother university such as AL-Fayoum University and Beni-Suef University which separated from Cairo University in (2005). Aswan University separated from Assiut University in (2012). Currently Egypt has 27 public engineering faculties including Al-Azhar, Military Technical College (MTC), Egypt Japan University for Science and Technology (EJUST) and university of Science and Technology at Zewail City. There are 16 private universities and 15 private higher technical institutes.

ENGINEERING EDUCATION IN JAPAN

The word ‘Meiji’ has a special meaning when talking about Japan’s modernization. The Meiji era ended literally in 1910 with the death of Emperor Meiji, but Meiji effectively continued up to 1985–another 75 years. The end of Meiji can be associated with the great achievement of Henry Dyer, a Scottish scholar, who started Japan’s modern engineering school in 1873 when he was only 24 years old. The school was then called the Imperial College of Engineering; it later became Japan’s premier engineering school, Tokyo University. This became the model for many other universities. Dyer’s modern engineering education and our traditional Japanese management (including life-long employment) systems were amalgamated to form Japan’s industry.

The existences of a large number of universities and engineering graduates have been major strengths of Japan. It should be noted that there are seven more major national universities which produce about 7000 additional graduates annually. Moreover, there are over 40 provincial national universities, several major private universities which have engineering departments, and thus more output of graduates.

STATISTICS OF ENGINEERING EDUCATION IN EGYPT

Engineers play an important role in developing and modernizing their countries. The number of available engineers in Egypt presently amounts to 608,000 Engineers. Egypt is a major supplier of engineers in the Arab World.

Currently Egypt has 27 public engineering faculties, 16 private faculties and 15 private higher technical institutes. Fig.1 presents an overview of the percentage of the number of engineering students to the total number of students in practical faculties (Medicine, Science, Agriculture and Engineering) for each public university. The average percentage of the number of students in practical faculties is 16.77%.

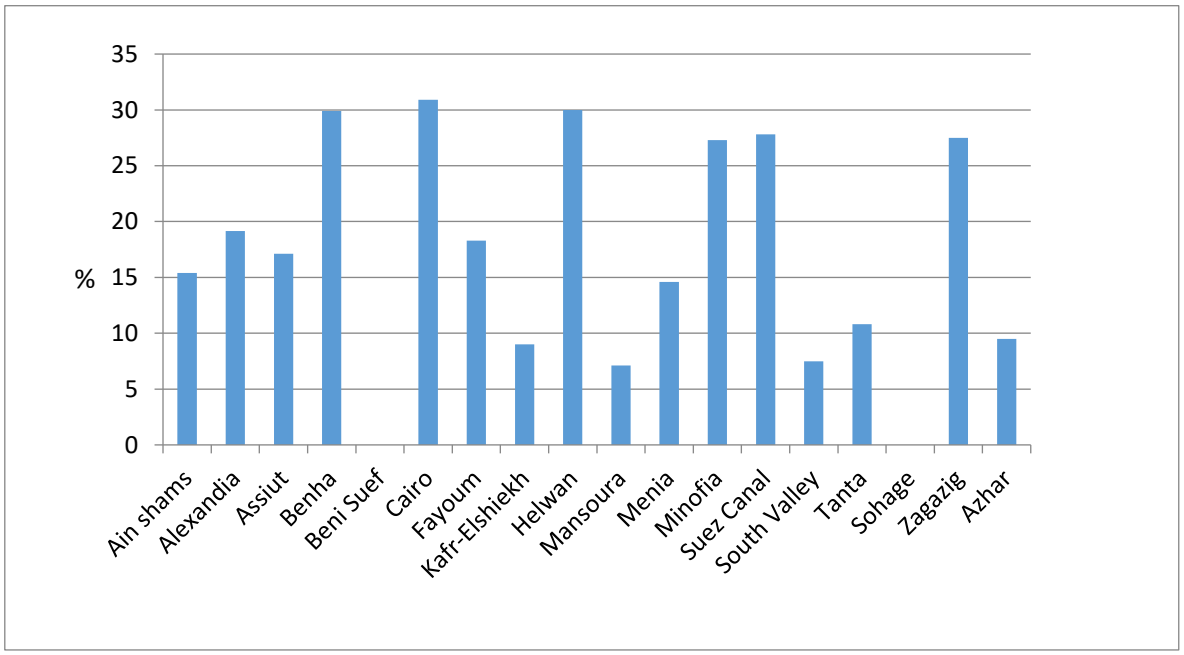


Figure 1. Percentage of Engineering students to the total number of students in practical faculties for public universities (Osman Lotfy El-Sayed, Juan Lucena, And Gary Downey “Engineering and Engineering Education in Egypt" IEEE Technology and SocietyMagazine Summer 2006, pp. 18-25)

The distribution of the graduating students over the different disciplines varied over the years according to job market variation. As shown in Fig (2) typical specializations ratios, at Cairo University, are 32% from Electrical Engineering, 21% Civil Engineering, 13% Mechanical and Aeronautical Engineering, 13% Architecture, 13% Petroleum, 8% Mining and Material Engineering and 5% Chemical Engineering. The staff distribution among the different disciplines reflects globally the same trend.

The female graduates represent more than 50% of Architecture and Chemical Engineering graduates, around 30% of those of Electrical Engineering, 25% of Civil Engineering and around 15% of the Mechanical Engineering ones (Fig.3).

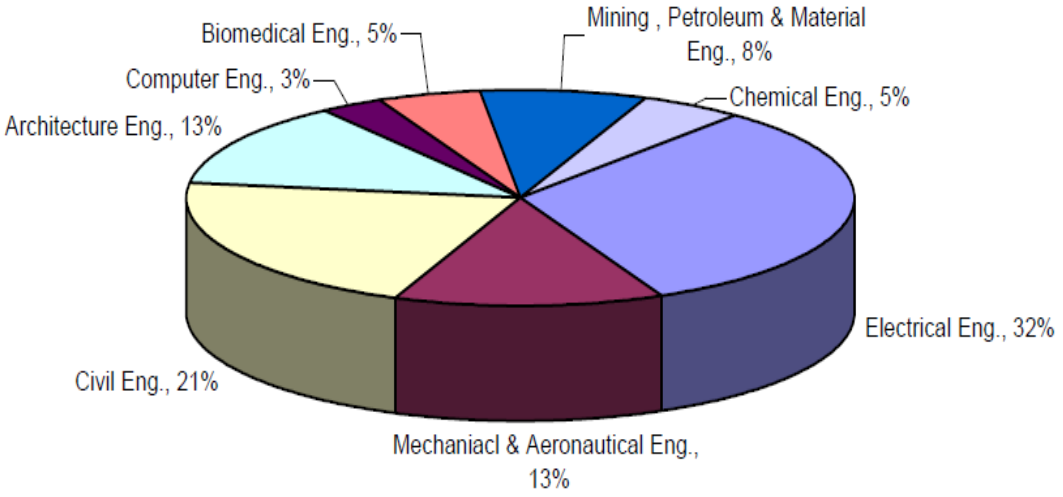


Figure 2 Specialization Distribution of engineering graduates at Cairo University among (Osman Lotfy El-Sayed, Juan Lucena, And Gary Downey "Engineering and Engineering Education in Egypt" IEEE Technology and SocietyMagazine Summer 2006, pp. 18-25)

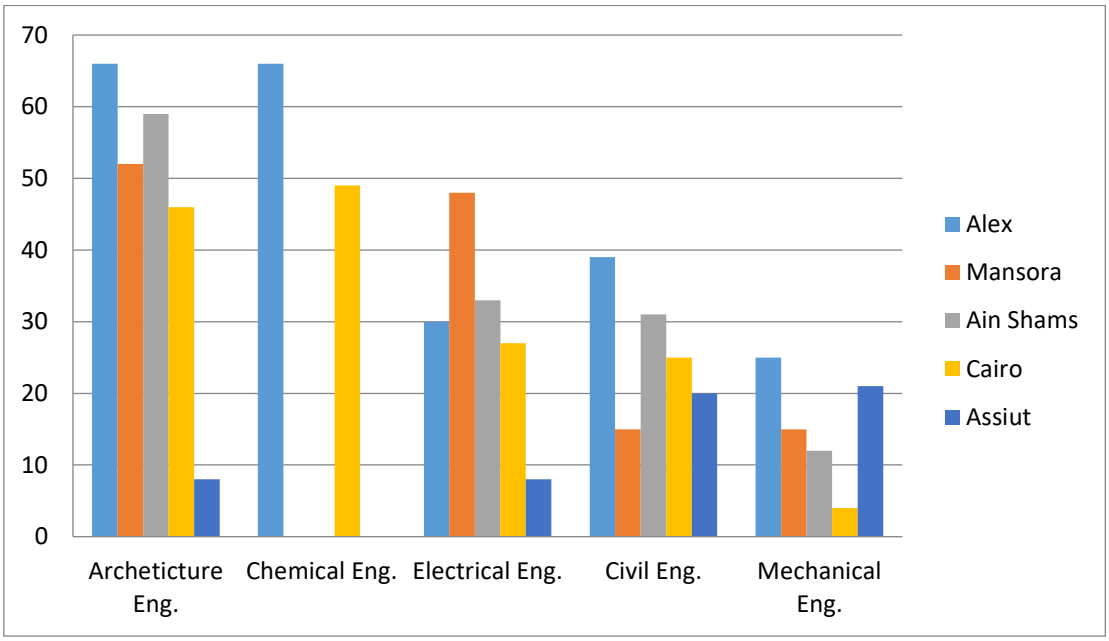


Figure 3. Percentage of female engineering graduates in the main engineering specializations in the main public universities (Osman Lotfy El-Sayed, Juan Lucena, And Gary Downey "Engineering and Engineering Education in Egypt" IEEE Technology and SocietyMagazine Summer 2006, pp. 18-25)

FACULTY OF ENGINEERING AND APPLIED SCIENCES

ARTICLE-1: FACULTY VISION

- Integration between Engineering disciplines and Applied Science disciplines, Japanese and regional industries and organizations to develop sustainable solutions to problems that have been identified and that require the knowledge and resources available at E-JUST.
- An opportunity for Engineering graduates to use their advanced knowledge and skills in a service setting, where they can explore the connection between technology and society.
- An inspiration for the E-JUST community to think beyond the standard norms of science and engineering projects and consider their use for the greater good.
- To become a world class Center of Excellence for higher education and research within regional and global reach.
- To become a first rate international academic institution known worldwide for the high standards of its educational system, the high standards of its graduates and for the achievements of its research centers.
- To aspire for regional and global synergy by reaching out for students, academic staff and researchers in the region and beyond.

ARTICLE-2: FACULTY MISSION

- Discovery and dissemination of new knowledge, through focusing on quality education and active learning to improve the quality of life.
- To become a role model for higher education and research institutions in Egypt by fostering the Japanese educational standards.
- To implement Japanese academic concepts founded on Experimental Learning methodology by integrating Lab-Based Learning, Project-Based Learning and Problem-Based Learning, with teamwork spirit.
- To provide a high-quality, effective and efficient learning environment for its students based on experimental learning approach.
- To prepare creative engineers who can design, manufacture, manage and operate intelligent systems in the professional fields of industry and economy.
- To lead institutions towards unifying main curriculum courses in specialized programs, to encourage internationalization of higher education in the near future, and to enable credit transfer and students' mobility, making the best use of the most successful practices to award Joint degrees.

ARTICLE-3: FACULTY OBJECTIVES

The educational plan of the Faculty of Engineering and Applied Sciences aims to graduate students who have the following attributes:

- Analytical skills
- Practical ingenuity
- Creativity
- Communication & teamwork skills
- Business & management skills
- High ethical standards
- Professionalism
- Leadership, including bridging public policy and technology
- Dynamism/agility/resilience/flexibility
- Lifelong learners

ARTICLE-4: ENGINEERING SCHOOLS AND UNDERGRADUATE PROGRAMS

The faculty is constituted of three engineering schools which include eight undergraduate programs of multidisciplinary engineering specializations namely as shown in Figure 8.

Importance of E-JUST Programs

1. To be a core of the science and technology university, having a larger impact for the society, in terms of a number of students.
2. To be an interface of the university to the society. The UG programs are usually closer to the society than the post-graduate ones, so that E-JUST's image can be disseminated to the wider society.
3. To be a resource pool of students for the existing engineering post-graduate programs.

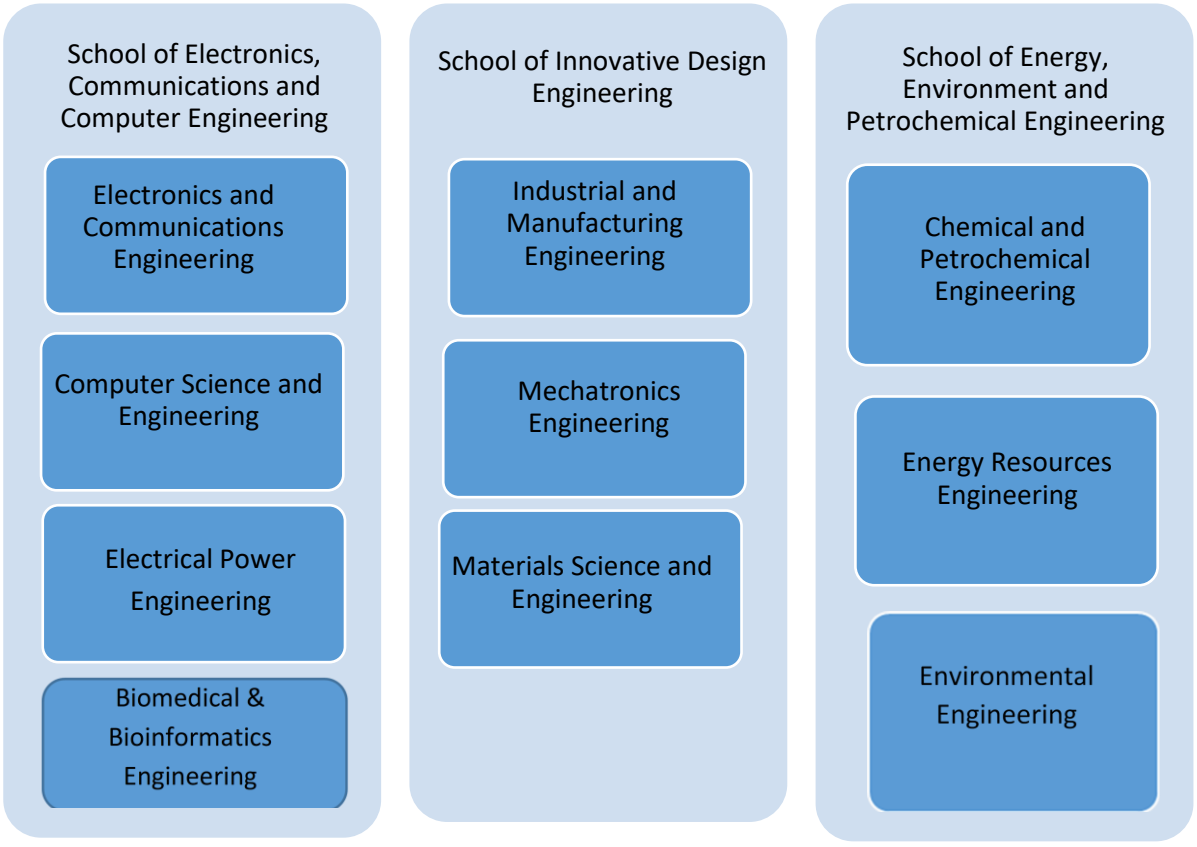


Figure 4. Engineering schools and UG programs

ARTICLE-5: DEGREES AWARDED

The university upon the request of the respective school council, grants the Bachelor of Science (BSc) degree in the following specializations:

1. Electronics and Communications Engineering
2. Computer Science and Engineering
3. Electrical Power Engineering
4. Biomedical and Bioinformatics Engineering
5. Industrial and Manufacturing Engineering
6. Mechatronics Engineering
7. Materials Science and Engineering
8. Chemical and Petrochemical Engineering
9. Energy Resources Engineering
10. Environmental Engineering.

MAIN SELLING POINTS

1. Active Experimental Learning including Lab based learning and project based learning and problem based learning.
2. Multidisciplinary modern curriculum distinguishing E-JUST graduates from other in Egypt and the Middle East.
3. Focus on the international trends in higher education focusing on soft skills, entrepreneurship, business skills, environmental and energy related issues.
4. Exposure to sophisticated research environment during the senior year in research labs or industrial sector.
5. Focus on research related activities in the senior year encouraging students to join the graduate Master and Doctorate programs in E-JUST.
6. Close relation with industry.
7. Diversified student life and activities, including extensive cultural activities and student exchange programs with Japanese universities, and athletic programs.
8. Career support based on the strong relations with industry and the reputation of the programs backed with the trust in Japanese higher education fame.
9. Industry training and exposure.

ARTICLE 6: ACADEMIC SEMESTERS AND REGISTRATION

The academic year is divided into three semesters:

1. The fall semester starts at the beginning of the fourth week of September and continues for 15 weeks, excluding the midterm and final examinations.
2. The spring semester starts at the beginning of the third week of February and continues for 15 weeks, excluding the midterm and final examinations.
3. The summer semester, which is a condensed semester, starts at the beginning of the first week of July and continues for 6 weeks, excluding the midterm and final examinations.

The registration for any course should take place during the two weeks preceding each semester, after satisfying all registration requirements and the payment of tuition fees

set by the University Council. The students can add and/drop courses during the first two weeks of the semester.

ARTICLE-7: INITIAL EVALUATION SYSTEM

1. Students applying to E-JUST should submit necessary application form to determine their eligibility to apply to E-JUST by meeting the basic requirements set forth by the University admission office to proceed further to the application process.
2. All applicants are required to take the University's entrance exams in mathematics, physics, chemistryand logical thinking. Only the top ranked students will be selected for the final admittance to the University's study programs.
3. Students are expected to pass in the entrance exams with the required grade set by the university to be considered for admission and show their readiness to proceed with the E-JUST educational system.
4. Documentation Requirements
   - Government-issued photo ID (National photo ID card or an Egyptian or Foreign Passport).
   - Printout of the Exam admission email/letter sent by the Admission Office with the candidate ID number.

ARTICLE-8: GENERAL ADMISSION REGULATIONS

- Egyptian applicants must have completed secondary school education and hold valid THANAWYA AMMA certificate- Mathematics Stream or equivalent (e.g. IGCSE, American Diploma).
- Japanese applicants must have completed high school education.
- Applicants from other countries must have equivalent secondary school certificate approved by the Supreme Council of Universities of Egypt (SCU).
- Applicants must pass successfully the written examinations in Math, Chemistry, Physics, and Logical thinking required for admission to E-JUST.
- Candidates are requested to pay the predetermined tuition fees approved by the university council or they should be supported by scholarships or grants.

ARTICLE-9: ENGLISH PROFICIENCY TEST

1. The language of study in E-JUST programs is English, and E-JUST sets up a system to ascertain the level of students in English, all applicants are required to take the E-JUST English Proficiency Test (EPT). Students who perform satisfactorily in their exam will be able to start their study programs directly after passing the entrance examination.
2. Students who have TOEFL (IBT) score of 60 or IELTS score of 6 will be waived from the E-JUST English Proficiency Test. Only valid certificate will be accepted (the certificate validity is 2 years after the test date)
3. Students who didn't pass the E-JUST English Proficiency Test might be enrolled in E-JUST as a provisional student for one academic year provided that he/she will pass the test within this year, otherwise the student enrollment will be terminated.

4. Provisional student can apply for 14 credit hours based on the university's academic schedule.
5. The Provisional Students will pay the fee for English intensive course. The fee of the English intensive is estimated as the fee of 2 credits hours of the FIBH students.

ARTICLE-10: TYPES AND CRITERIA OF HIGH SCHOOL CERTIFICATES

The minimum admission requirements will be announced before the entrance examination for the following categories

1. *Egyptian Thanawiya Amma Certificate*
2. *Thanawiya Amma Certificate from Arab Countries*.
3. *British Schools:* GCE/GCSE/IGCSE: A maximum of 3 O-level courses can be from grade 11. In addition, at least two AS or A-level courses from grades 11 or 12 in biology, chemistry, physics, or mathematics is required. Priority will be given to students with more courses in Advanced Level.
4. *American high school diploma* with a minimum average of 3.00 out of 4.00 and must complete three years of a University preparatory program including grade 10, 11 and 12. An applicant must obtain SAT I score of at least 1450 or ACT-E, and SAT-II in two subjects (Math, Physics, Chemistry, Biology) with a minimum total score of 1100 and a minimum score of 500 on each subject.
5. Equivalent to Thanawiya Amma for the following and all other certificates Approved by SCU:
    - Canadian certificates
    - French Baccalaureate
    - German Abitur Certificate
    - International Baccalaureate

ARTICLE-11: TUITION FEES

1. The University Council determines the tuition fees early March annually.
2. The student pays the tuition fees at the beginning of the fall, spring, and summer semesters.
3. Students will pay tuition fee according to the methods and regulation set by the university council.

4. The registration of a student in a semester is terminated if he/she does not pay the tuition fees within the first week from the beginning of that semester.
5. The student enrolled in a program and intended to withdraw from the program after the first week, cannot redeem the full tuition fees that he/she has paid according to the regulation set by the university council.
6. The student should pay the fees of any repeated course. The scholarships do not cover the fees of any repeated course.

ARTICLE-12: ACADEMIC ADVISOR

The respective Department Council assigns an academic advisor for each student. The academic advisor will be responsible for:

- Advising the student during his course work.
- Helping the students in the registration of courses and number of credit hours in each semester.
- Helping the student to select the elective courses relevant to the field he/she wishes to study.
- Recommending any additional complementary courses that, in the opinion of the academic advisor, the student has to take.

ARTICLE-13: STUDY SYSTEM

The study in the undergraduate programs is in credit hours. The regulations and requirements are indicated in Articles 14 through 30.

ARTICLE-14: UNDERGRADUATE COURSES

1. A contact hour of any undergraduate course is equivalent to a period of instruction of 50 minutes weekly in Fall- and Spring semesters, and of 100 minutes weekly in summer semester.

2. In Fall - and spring semesters the student can register up to 20 credit hours and of no less than 14 credit hours. In summer semester the student can register up to 6 credit hours.

3. To register a course, the student should register and attended (study and exams) his pre-request course if any in a preceding semester.

4. To register a course in a semester, the student should register his co-request course in the same semester, if any.

5. A student who has Grade Point Average (GPA) greater than or equal 3.7 is allowed to:

- May have access to travel opportunities to the Japanese supporting universities according to the university regulation in this year.

- May have partial tuition waiver, in proportional to the GPA according to the university regulation in this year.

6. The undergraduate courses are divided into:

- University requirements (UR) / Liberal arts courses
- Basic science courses
- Basic Engineering courses

- Applied Engineering courses
- Specialization courses

7. Each 1.00 Credit Hour in a course carries 100 marks.

ARTICLE-15: COURSE AND LABORATORY ATTENDANCE

The student is not allowed to attend the final exam of a course unless he/she attended at least 75% of the study hours of the course. In this case, the student will be considered as "Forced Withdrawn" and the course will appear in his certificate as (FW), and will not be accounted in calculating the CGPA. The student should pay a new fee of the credit hours of the FW, W and WF courses when he/she repeats it.

ARTICLE-16: COURSE CODES

1. The undergraduate faculty and programs engineering courses are coded according to the following scheme

AAA	N1	N2	N3

AAA: Department/Program/Specialization code offering the course
N1: Class level (1-4) in which the course is typically offered.
N2: Semester (1 or 2) in which the course is typically offered.
N3: Sequence of the courses among its specialized

Table 1 The Departments responsible for teaching

School	Department	Dept Code	Offered Program	Program Code
Electronics, Communications, and Computers Engineering (ECCE)	Computer Science and Engineering	CSE	Computer Engineering	CSE
	Electronics and Communications Engineering	ECE	Electronics and Communications Engineering	ECE
			Electrical Power Engineering	EPE
			Biomedical and Bioinformatics Engineering	MIE
Innovative Design Engineering (IDE)	Industrial Engineering and Systems Management	IEM	Industrial and Manufacturing Engineering	IME
	Mechatronics and Robotics Engineering	MTR	Mechatronics Engineering	MTE
	Materials Science and Engineering	MSE	Materials Science and Engineering	MSE

Energy, Environment, Chemical and Petro Chemical Engineering (EECE)	Energy Resources Engineering	ERE	Energy Resources Engineering	ERE
	Chemical and Petrochemical Engineering	CPE	Chemical and Petrochemical Engineering	CPE
	Environmental Engineering	ENV	Environmental Engineering	ENV

Program codes are in some cases different from department codes.

2. The coding systems for university requirements' courses and the faculty requirements'-basic science courses are given in articles No. 27 and 28, respectively.

ARTICLE-17: EVALUATION AND GRADING SYSTEMS

The final grade and the grade point in a course are based on the total aggregate of marks earned from all activities done in the course

Table 2 - Final grades for courses shall be recorded as follows:

Percentage Marks		Grade	
≥ 95%	Excellent	4.00	A+
≥ 90% -less than 95%		3.70	A
≥ 85%-less than 90%	Very good	3.30	B+
≥ 80%-less than 85%		3.00	B
≥ 75%-less than 80%	Good	2.70	C+
≥ 70%-less than75%		2.30	C
≥ 65%-less than 70%	Pass	2.00	D+
≥ 60%-less than 65%/(≥ 50%-less than 65%)*		1.70	D
Less than 60%/(Less than 50%)*	Fail	1.00	F

* For the university requirements and liberal art courses

Total grade points secured divided by the total Credit Hours taken shall be computed as Grade Point Average (GPA).

A student is declared to have passed the semester examinations when he/she passes in all the courses of the semester having minimum semester CGPA of 2.00.

To obtain a bachelor's degree from the Faculty of Engineering and applied science, the student must successfully pass a number of credit hours not less than 160 hours for all programs with an average score of not less than GPA 2.00.

In addition to the above grade, the following grades may appear in the student transcript:

I Work incomplete due to circumstances beyond the student's control.

IF Unremoved Incomplete-Failing; if the student fails to achieve a passing grade by the tenth week of the following subsequent semester of enrollment.

W Withdrawn; a student was enrolled in a credit course and withdrew from the course before the tenth week in Fall and Spring semesters and before the fourth week in the summer semester.

WF Withdrawn Failing; a student was enrolled in a credit course and withdrew from the course after the tenth week in Fall and Spring semesters and after the fourth week in the summer semester.

FW Forced withdrawal; Students who do not achieve the minimum attendance of the course sessions.

A course in which the grade **F, IF,FW, W** or **WF** is received will not counted toward degree requirements. A course in which the grade of I is received is not counted toward degree requirements until the grade I is replaced by grade A, B, C, or D.

The semester GPA is the sum of all quality points (quality points of a course = course credit hours x grade points of the course) for one semester for grades A+, A, B+, B, C+, C, D+, D, IF, WF, and F divided by the sum of all corresponding semester credit hours. Grades IF and I are excluded from all grade-point computation. The cumulative GPA is computed similarly using all the grades received by the student.

An honorary degree is awarded to a student who has a minimum cumulative average of 3.7 in every semester of study in credit hours programs. The award of the honorary degree requires that the student has not received an F in any course of study inside or outside E-JUST.

A student is transferred from level 1 to level 2 after successfully completing 36 credit hours, and from level 2 to level 3 after successfully completing 72 credit hours, from level 3 to level 4 after completing 108 credit hours, and from level 4 to level 5 after successfully completing 144 credit hours.

ARTICLE-18: ASSESSMENT OF COURSES

For each course in all programs, the instructor adopts some of the methods of assessment shown below:

HA	Homework Assignment
QZ	Quizzes
ME	Midterm Examination
FE	Final Examination
OP	Oral Presentation
TP	Term Project
LBR	Lab Based Individual Reports
LBA	Laboratory Based Assignment
LE	Laboratory Examination

PBA	Project Based Assignment
ITR	Industrial training report
ITP	Industrial training presentation
ITM	Industrial training mentor assessment
ITA	Industrial training advisor assessment
GPR	Graduation project report
GPP	Graduation project presentation
OE	Oral examination

The assessment of the courses is shared as 30% for class works including quizzes, assignments and small projects, 30% for the midterm exam held in the seventh/eighth week and 40% for the final exam (written or oral).
The lab based courses are continues assessments courses; i.e. 100% of the mark are allocated for lab work during the semester weeks.

ARTICLE-19: REPETITION OF COURSES

Courses in which a student received a grade of F, WF, FW should be repeated. Courses in which a student received a grade of D+, or D may be repeated. Repetition more than once requires the approval of the department chair. If a student takes the same course more than once, all grades will appear on the student's record. The student will receive credit for the course only once which is the most recently earned grade and will be used in computing the cumulative GPA. This is used only for the first repeated 18 credit hours. In case of further repetition, after the first 18 credit hours repeated, the cumulative GPA is based on all grades assigned and total credit hours attempted. All grades received in the course will be used in computing the semester GPA. The student should pay a new fee of the credit hours of any repeated course.

ARTICLE-20: ACADEMIC PROBATION AND DISMISSAL

Students will be placed on academic probation if their cumulative GPA falls below 2.0. They are not allowed to register more than 14 hours in the coming semester. Normally, the student is expected to attain a 2.0 cumulative GPA at the end of any probationary semester. Students who fail to achieve a 2.0 cumulative GPA at the end of their probationary semester may be academically dismissed, depending on their credit level as detailed below.

i- Students who have finished four probationary semesters will be dismissed from the university in the event their cumulative GPA remains below 2.0 at the end of their probationary semesters.

ARTICLE-21: APPLICATION FOR ACADEMIC REINSTATEMENT

a. Students who have been dismissed may apply to the Faculty Petition committee for reinstatement on the grounds of mitigating circumstances, such as (i) demonstrated progress toward a degree by successful completion of 24 degree-applicable credits in the preceding year, (ii) continuing improvement in the cumulative grade point average, and (iii) progress in general education and major requirements.

b. The application for reinstatement must include a written statement explaining the circumstances leading to dismissal and a proposed plan to remedy those circumstances. Students are encouraged to consult with their academic advisors prior to submitting their applications to the Faculty Petition Board.

ARTICLE-22: LEAVES OF ABSENCE AND REINSTATEMENT

Students have the option of taking a leave of absence for up to one year upon filing a petition to do so with the Office of the School Dean and receiving approval. The leave may be extended for up to one additional year provided the student files (before the end of the initial one-year leave) a petition for the leave extension with the Office of the Dean and receives approval. Leaves of absence for undergraduates may not exceed a cumulative total of two years. Undergraduates who take an approved leave of absence while in good standing may enroll in the Faculty for the subsequent semester with the privileges of a returning student. When a student is granted a leave of absence after the beginning of the term, courses in which the student was enrolled after the drop deadline appear on the student's transcript and show the symbol 'W' (withdrawn). Students who have exceeded their two years of approved leave must apply for reinstatement. The Council may determine whether the application for reinstatement will be approved or not, and/or the conditions a student must meet in order to be reinstated. Reinstatement decisions may be based on the applicant's status when last enrolled, activities while away from campus, the length of the absence, the perceived potential for successful completion of the program, as well as any other factors or considerations regarded as relevant to the Council. Applications for reinstatement must be submitted to the Office of the School Dean no later than four weeks prior to the start of the term in which the student seeks to enroll in classes.

ARTICLE-23: COURSE CREDIT TRANSFER

The respective Department Council can allow the student to transfer credit-hour courses that he/she earned during his/her study in an equivalent specialized program in another University/Institute under the following conditions.

1. Satisfy the minimum E-JUST requirements applicable to the high school graduates.
2. The student should have at least grade B (3) in each transferred course.
3. The transferred courses must have equivalent counterparts in the respective program.
4. These courses will not be included in calculating the CGPA for the student and will just be pointed out in the student transcripts as transferred courses and will be accounted for the credit hour requirements.
5. These courses will be subject to academic evaluation and decision by the admission committee at E-JUST.

ARTICLE-24: ACADEMIC PLAN

The minimum number of credit hours required for obtaining the Bachelor of Science Degree (B.Sc.) in Engineering is 160 credit hours in not less than nine main (Fall and spring) semesters and maximum of 8 years.

A final written examination is held for each course at the end of the semester. A student must obtain at least 40% of the final exam to pass the course.

A student may study one elective course from other engineering program.

New elective courses can be added to the elective pool of each program upon the approval of the school, education and the university council.

Table 3 Indicative Curriculum Content by Knowledge Area*

Subject Area	Credit hours	%
University Requirements/Liberal Arts	26	16
Basic Sciences and Mathematics	27	17
Basic Engineering Sciences	27	17
Applied Engineering Sciences and Design	66	41
Graduation Project and Industrial Training	14	9
Total	160	100

ARTICLE-25: INDUSTRIAL TRAINING

Industrial training is considered a complementary part of the study. The B.Sc. degree is not granted unless the student spends a total of two months of industrial training throughout the academic years starting from the first year. Each Department Council specifies an Industrial training system to be implemented during holidays, under the supervision of department faculty members. Industrial training weighs 4 credit hours; each credit hour is considered as 5 contact hours as the student is expected to stay one shift (8 hrs) per day in the factory/field. The evaluation criterion is specified according to E-JUST system.

ARTICLE -26: STUDENT WORK LOAD

The Student Workload Load (SWL) is an estimate of the amount of work needed for an average university student to earn an average grade. The SWL per credit does not vary with the method of delivery of the course or the length of the academic term. One credit represents, for the average University undergraduate student, three hours of academic work per week (including lectures, laboratories, recitations, discussion groups, field work, study, and so on), averaged over the semester, in order to complete the work of the course to achieve an average grade.

Therefore for one credit hour SWL= 1 credit x 3 hours of work per week x number of weeks (14-15) in a semester equals 42 to 45 hours of academic work. Thus, enrollment for 15 credits in a semester represents approximately 45 hours of work per week, on average, over the course of the semester.

ARTICLE-27: UNIVERSITY REQUIREMENTS – LIBERAL ARTS COURSES

The study of liberal arts is one of the main distinct features of E-JUST undergraduate programs that make such programs different from all other programs offered by other universities.

The focus of E-JUST liberal arts requirements is on:

- Creativity and decision making by allowing freedom of thinking.
- Logical and critical thinking.
- Multidisciplinary and synthesizing.
- Promotion of diversity by learning various ways of explaining ideas and phenomena.
- Soft skills including leadership qualities.

The pedagogy used includes:

- Students centered by maintaining small size classes.
- Active learning through group work, discussions, projects, and problem solving.
- Reflection of one's learning.
- Allowing students to interact with others beyond their major.

These requirements are specified to help building the knowledge and skills needed for a modern society.

The aims of the liberal arts courses are to help individuals for:

1- Preparing domestic citizenship and free thinking personnel.
2- Character building
3- Fostering ambition to use their specialized knowledge in the real world with transferable skills.
4- Exposing to broad fields such as humanities, social sciences, and natural sciences to inculcate in multidisciplinary thinking.
5- Stimulating and satisfying the intellectual curiosity.

6- Developing the ability to identify creative solutions to problems and take action in the future society.

The weight of University Requirements (UR) courses is 26 credits. The weight of each course in this group is 2 credits. The student has to choose 4 or 5 elective courses of 8 credit hours, in addition to 10 core courses of 18 credit hours.

Through these courses students will cover the bases of arts and humanities, social sciences, natural sciences as well as attaining core skills related to critical and creative thinking and technical writing.

Liberal arts include four categories: arts and humanities, social sciences, natural sciences and core skills. The coding system for these courses is based on the categories (1, 2, 3 and 4) for the four categories, respectively.

1-University Requirements (Liberal Arts) Core Courses

Each student has to take the following 10 core courses, each one with 2 credit hours, except for the Japanese language course (one credit hour). These courses are classified as follows:

A. Arts and Humanities	Prerequisites	Cr Hrs.
1. LRA 101 Japanese Culture	none	2
2. LRA 102 Introduction to Philosophy	none	2
3. LRA 103 Fine Arts Appreciation, Drawings and Paintings	none	2
B. Social Sciences		
4. LRA 201 Introduction to Economics and Sustainable Development	none	2
5. LRA 202 Peace studies	none	2
C. Natural Sciences		
6. LRA 301 Environments and Earth Science.	none	2
D. Key Skills		
7. LRA 401 Japanese Language (1) (one credits)	none	1
8. LRA 402 Japanese Language (2) (one credits)	LRA 401	1
9. LRA 405 Key skills seminar (1)	none	2
10. LRA 406 Key skills seminar (2)	none	2

2-University Requirements (Liberal Arts) Elective Courses

The student is free to select one/two courses of two/one credit hours from each of the following four categories of A, B, C and D.

A. Arts and Humanities (UR Elective 1)	Prerequisites	Cr Hrs.
1. LRA 104 Music and Technology	none	2
2. LRA 105 Theater and Drama	none	2
3. LRA 106 Physical Education	none	2
4. LRA 107 Selected topics in Japanese arts	none	2

	5. LRA 108 Art and Architecture of Ancient Egypt	none	2
	6. LRA 109 Introduction to Cultural Anthropology	none	2
	7. LRA 110 Modern Egyptian History		2
B. Social Sciences (UR Elective 2)			
	1. LRA 203 Entrepreneurship and Innovation	none	2
	2. LRA 204 Public Policy.	none	2
	3. LRA 205 Egyptian Business Regulations	none	2
	4. LRA 206 Sociology of work	none	2
	5. LRA 207 African and Middle Eastern studies	none	2
C. Natural Sciences (UR Elective 3)			
	1. LRA 302 Introduction to Life Sciences	none	2
	2. LRA 303 Introduction to Environmental Biology	none	2
	3. LRA 304 Water and Politics in Africa and Middle East	none	2
	4. LRA 305 Astronomy	none	2
	5. LRA 306 Natural Resources and Sustainability	none	2
D. Key Skills (UR Elective 4)			
	1. LRA 403 Japanese Language (3)	LRA 402	1
	2. LRA 404 Japanese Language (4)	LRA 403	1
	3. LRA 407 English Language	none	2
	4. LRA 408 Arabic Language	none	2
	5. LRA 409 Research Methods	none	2
	6. LRA 410 Fundamentals of Communication	none	2
	7. LRA 411 Transformational Leadership	none	2

ARTICLE-28: FACULTY REQUIREMENTS- BASIC SCIENCE COURSES

Basic sciences courses are equivalent to 27 credit hours, including two courses in each of mathematics, chemistry and physics to build strong basic science background for engineering students.

Course Code	Course Title	Prerequisites	Credits
MTH 111	Mathematics (1) (Calculus + Linear Algebra)	-	3
PHY 111	Physics (1)	PHY 112 *	3
CHM 111	Chemistry (1)	112 * CHM	2
PHY 112	Basic Sciences Lab-1 (Physics (1))	PHY 111 + *IME 111*	1
CHM 112	Basic Sciences Lab-2 (Chemistry (1))	CHM 111+ *IME 111*	1
MCE 111	Mechanics (Statics + Dynamics)	-	3

MTH 121	Mathematics (2) (Calculus + Linear Algebra)	111 MTH	3
PHY 121	Physics (2)	PHY 111 +122 PHY*	3
CHM 121	Chemistry (2)	CHM 122 + CHM 111*	2
PHY 122	Basic Science Lab-3 (Physics (2))	PHY* 121	1
CHM 122	Basic Science Lab-4 (Chemistry (2))	CHM* 121	1
BIO 121	Fundamentals of life Science	-	2
MTH 211	Probability and Statistics	MTH 121	2
Total			27

ARTICLE-29: SCHOOL REQUIREMENTS - BASIC ENGINEERING COURSES

The weight of the basic engineering faculty requirement courses is equivalent to 27credit hours

Course Code	Course Title	Prerequisites	Credits
IME 111	Safety and Risk Management	-	2
IME 121	Engineering Drawing	IME 111	3
EPE 121	Electrical Engineering (Circuits + Machines)	PHY 111 + EPE 122*	3
EPE 122	Electrical Engineering Lab	EPE 121*	1
CSE 211	Computer Programming	CSE 212*	2
CSE 212	Computer Programming Lab	CSE 211*	1
ECE211	Introduction to Electronics Engineering	EPE 121 + ECE 212*	2
ECE212	Electronics Engineering Lab	ECE 211*	1
CPE 211	Introduction to Energy, Environmental and Chemical Engineering	-	2
CPE212	Energy, Environmental and Chemical Eng. lab	CPE 211*	1
IME 211	Introduction to Manufacturing Processes	IME 121 + IME 212*	2
IME 212	Manufacturing Processes Laboratory	IME 111 + IME 211	1
EPE 221	Measurements and Instrumentations	ECE 211 + EPE 222*	2
EPE 222	Measurements and Instrumentations Lab	EPE 221*	1
MSE 221	Fundamentals of Materials Science	PHY 121 + MSE 222*	2
MSE 222	Materials Science Lab	MSE 211*	1
Total			27

ARTICLE-30: GRADUATION PROJECT

In the final two semesters, a senior student has to be engaged in one of the research laboratories of the corresponding department to carry out his graduation project. The graduation project weights 10 credit hours distributed on two semesters. One credit hour for the project is equivalent to 4 contact hours because the student needs to stay in a research lab during the project period according to the Japanese best practices. The first part of the graduation project cannot be registered before semester 8 and the second part of the graduation project cannot be registered before semester 9.

ARTICLE-31: STUDY PLAN

The students of the eight programs are going to study the same courses in the first two semesters. The student will start applied engineering courses towards his/her major specialization from the fourth semester. The different categories of courses that form each program study plan are as follows:

Course Type	Requirement	Color code in the study plan
1. Liberal Arts Course	University	
2. Basic Science Courses	Faculty	
3. Basic Engineering Courses	School	
4. Applied Engineering Courses.	General specialization	
5. Specialization courses	Specific (Program) specialization	
6. Graduation project		
7. Industrial training.		

SCHOOL OF ENERGY, ENVIRONMENT, CHEMICAL AND PETROCHEMICAL ENGINEERING (EECE)

ARTICLE-32: VISION

To be a leading and well established school in area of Energy, Environmental and Chemical and Petrochemical Engineering in the world.

ARTICLE-33: MISSION

To provide students with relevant and efficient education, learning and research by adapting the Japanese style of education in the EECE school, as well as impacting the society through professionalism and ethics.

ARTICLE-34: OBJECTIVES

- To adopt Japanese style of education to students.
- To provide an effective education, research and communication skills.
- To raise the consciousness of the students with lifelong learning in their fields.
- To improve the ethics and knowledge of students regarding the technological impact on society and environment.

ENVIRONMENTAL ENGINEERING PROGRAM (ENV)

INTRODUCTION

The environmental engineering program is looking for strengthen its position in areas where it is viewed as preeminent, including: global environment, water and air quality, sustainable design, solid waste and environmental hydraulics. Continue to build upon our strong foundation in areas including clean production, water and energy conservation and green economy and to some extent in material and biomedical engineering, with the aim of becoming recognized as a top-tier program for education and research in these areas

ARTICLE-35: VISION

Is to be widely recognized and acknowledged among the leading ranks of environmental engineering in the world.

ARTICLE-36: MISSION

- Provide students with an excellent and relevant education, learning and research at an utmost international level of excellence.
- To impact the society through the pursuit of professionalism and ethics.

ARTICLE-37: OBJECTIVES

The Educational Objectives of the Environmental Engineering are:

- To enable students to excel in their careers by providing them strong education and communication skills.
- To raise the awareness of the student with lifelong learning and contemporary issues in their field.
- To inspire students the ethics and knowledge regarding the technological impact on society and environment
- To transfer the Japanese style education and work environment to our students.

ARTICLE-38: PROGRAM OUTCOMES

General outcomes

a) Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
b) Design and conduct experiments as well as analyze and interpret data.
c) Design a system; component and process to meet the required needs within realistic constraints.
d) Work effectively within multi-disciplinary teams.
e) Identify, formulate and solve fundamental engineering problems.
f) Display professional and ethical responsibilities; and contextual Understanding
g) Communicate effectively.
h) Consider the impacts of engineering solutions on society & environment.
i) Engage in self- and life- long learning.

j) Demonstrate knowledge of contemporary engineering issues.
k) Use the techniques, skills, and modern engineering tools, necessary for engineering practice.

Specialization outcomes

l) Demonstrate knowledge and understanding of the fundamentals, basic characteristics and features of environmental Engineering.
m) Demonstrate knowledge and understanding of the principles of environmental engineering including wastewater treatment, air pollution, solid waste, etc..
n) Demonstrate knowledge and understanding of general principles of design techniques specific to particular environmental issues
o) Demonstrate knowledge and understanding of environmental impact of various industries, waste minimization and treatment of industrial facilities.
p) Integrate processing steps into a sequence and apply analysis technique such as energy and mass balance.
q) Collect data, draw simplified flow sheets, charts and curves and interpret data derived from laboratory observation.
r) Perform complete environmental.
s) Use environmental engineering IT tools and programming in design.
t) Determine the characteristics and performance of measurement and control systems.

ARTICLE-39: PROGRAM COURSES

code	Compulsory courses	Prerequisite courses	Credit hours
ENV 311	Seminar on ENV		2
ENV 312	Fundamentals of Environmental Engineering		4
ENV 313	Global Environmental Engineering		4
ENV 314	Water Quality and Analysis		4
ENV 315	Environmental Hydraulics		4
ENV 316	Municipal Solid Waste		4
ENV 321	Project Based Learning on ENV		4
ENV 322	Air Quality and Pollution		4
ENV 323	Urban Development and Environmental Planning		4
ENV 324	Waste Water Treatment	CHM 111	4
ENV 325	Desalination Processes and Systems		4
ENV 411	Ground water Engineering		5
ENV 412	Sustainable Design and Technologies in Buildings		4
ENV 421	Clean Production Technologies	ENV 324	4
ENV 422	Environmental Impact Assessment and Legalization	ENV 314, ENV 322	4

code	Elective course	Prerequisite courses	Credit hours
ENV413	Treatment of Hazardous Waste		4
ENV414	Green Economy		4
ENV415	Air Pollution Monitoring and Control		4
ENV416	Health and Environmental Impact of (Water-Energy-Food Nexus)		4
ENV417	Alternative and Future Energies Applications (Renewable and Nuclear Energies)		4

ENV418	Industrial Safety and Regulations		4
ENV423	Modelling of the Built Environment		4
ENV424	Environmental Statistics and Modeling	MTH 211	4
ENV425	Sustainable Materials in Buildings		4
ENV426	Cities and Climate Change		4
ENV427	Water and Energy Conservation (in Different Sectors; Environmental Impact)		4
ENV428	Ecological Design of Environmental Systems		4

Graduation Project Thesis:

ENV 420 Graduation Project I: (3 Credit hours)
ENV 500 Graduation Project II: (7 Credit hours)

Industrial training

ENV 499 Industrial Training (4 credit hours)

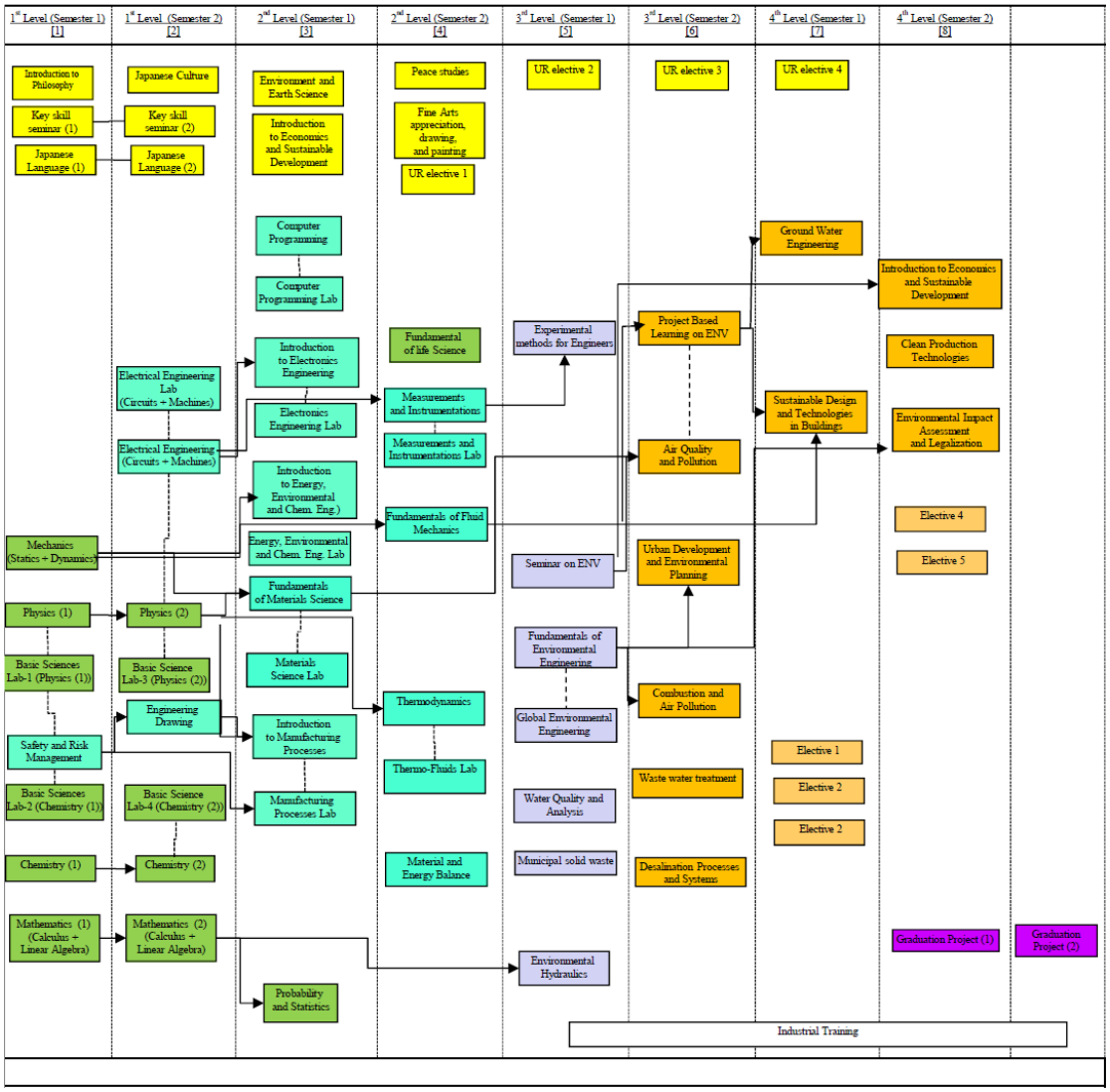
ARTICLE-40: STUDY PLAN, PREREQUISITES, WORK FLOW, ILOS CROSS MAPPING AND ASSESSMENT TOOLS

level	Course Code	Course	Credits	Lecture	Tutorial	Lab	Contact Hrs.	SWL	Pre/ Co-requisites	Grading System						Credits
										Class	Mid Term	Lab	Oral	Final	Exam Duration	
1	LRA 102	Introduction to Philosophy	2	2	0	0	2	90		0.3	0.3			0.4	2	20
	LRA 405	Key Skills Seminar (1)	2	2	0	0	2	90		0.3	0.3			0.4	2	
	LRA 401	Japanese Language (1)	1	0	0	2	2	45		0.3	0.3			0.4	1	
	MTH 111	Mathematics (1) (Calculus + Linear Algebra)	3	2	2	0	4	135		0.3	0.3			0.4	3	
	PHY 111	Physics (1)	3	2	2	0	4	135	PHY 112*	0.3	0.3			0.4	3	
	CHM 111	Chemistry (1)	2	2	0	0	2	90	CHM 112*	0.3	0.3			0.4	2	
	PHY 112	Basic Sciences Lab-1 (Physics (1))	1	0	0	2	2	45	IME 111* + PHY 111*			1			-	
	CHM 112	Basic Sciences Lab-2 (Chemistry (1))	1	0	0	2	2	45	IME 111* + CHM 111*			1			-	
	MCE 111	Mechanics (Statics + Dynamics)	3	2	2	0	4	135		0.3	0.3			0.4	3	
	IME 111	Safety and Risk Management	2	2	0	0	2	90		0.3	0.3			0.4	2	
2	LRA 402	Japanese Language (2)	1	0	0	2	2	45	LRA 401	0.3	0.3			0.4	2	22
	LRA 406	Key Skill Seminar (2)	2	2	0	0	2	90		0.3	0.3			0.4	2	
	LRA 101	Japanese Culture	2	2	0	0	2	90		0.3	0.3			0.4	2	
	MTH 121	Mathematics (2) (Calculus + Linear Algebra)	3	2	2	0	4	135	MTH 111	0.3	0.3			0.4	3	
	PHY 121	Physics (2)	3	2	2	0	4	135	PHY 111 + PHY 122*	0.3	0.3			0.4	3	
	CHM 121	Chemistry (2)	2	2	0	0	2	90	CHM 111 + CHM 122*	0.3	0.3			0.4	2	
	PHY 122	Basic Science Lab-3 (Physics (2))	1	0	0	2	2	45	PHY 121*			1			-	
	CHM 122	Basic Science Lab-4 (Chemistry (2))	1	0	0	2	2	45	CHM 121*			1			-	
	EPE 121	Electrical Engineering (Circuits + Machines)	3	2	2	0	4	135	PHY 111 + EPE 122*	0.3	0.3			0.4	3	
	EPE 122	Electrical Engineering Lab(Circuits + Machines)	1	0	0	2	2	45	EPE 121*			1			-	
	IME 121	Engineering Drawing	3	2	0	2	4	135		0.3	0.15	0.15	-	0.4	3	

3	LRA 301	Environment and Earth Science	2	2	0	0	2	90	PHY 121	0.3	0.3			0.4	2	21
	LRA 201	Introduction to Economics and Sustainable Development	2	2	0	0	2	90		0.3	0.3			0.4	2	
	MTH 211	Probability and Statistics	2	2	0	0	2	90	MTH 121	0.3	0.3			0.4	2	
	CSE 211	Computer Programming	2	2	0	0	2	90	CSE 212*	0.3	0.3			0.4	2	
	CSE 212	Computer Programming Lab	1	0	0	2	2	45	CSE 211*	0.3	0.3			0.4	-	
	ECE 211	Introduction to Electronics Engineering	2	2	0	0	2	90	EPE 121 + ECE 212*	0.3	0.3			0.4	2	
	ECE 212	Electronics Engineering Lab	1	0	0	2	2	45	ECE 211*			1			-	
	CPE 211	Introduction to Energy, Environmental and Chem. Eng.	2	2	0	0	2	90	CPE 212*	0.3	0.3			0.4	2	
	CPE 212	Energy, Environmental and Chem. Eng. Lab	1	0	0	2	2	45	CPE 211*			1			-	
	MSE 221	Fundamentals of Materials Science	2	2	0	0	2	90	PHY 121 + MCE 111 + MSE 222*	0.3	0.3			0.4	2	
	MSE 222	Materials Science Lab	1	0	0	2	2	45	MSE 221*			1			1	
	IME 211	Introduction to Manufacturing Processes	2	2	0	0	2	90	IME 121 + IME212*	0.3	0.3			0.4	2	
	IME 212	Manufacturing Processes Lab.	1	0	0	2	2	45	IME 111 + IME 211*			1			-	
4	LRA 202	Peace Studies	2	2	0	0	2	90		0.3	0.3			0.4	2	19
	LRA 103	Fine Arts Appreciation, Drawing, and Painting	2	2	0	0	2	90		0.3	0.3			0.4	2	
	LRA xxx	UR elective 1	2	2	0	0	2	90		0.3	0.3			0.4	2	
	BIO 121	Fundamentals of Life Science	2	2	0	0	2	90		0.3	0.3			0.4	2	
	EPE 221	Measurements and Instrumentations	2	2	0	0	2	90	ECE 211 + EPE 222*	0.3	0.3			0.4	2	
	EPE 222	Measurements and Instrumentations Lab	1	0	0	2	2	45	EPE 221*			1			1	
	CPE 213	Material and Energy Balance	3	2	2	0	4	135		0.3	0.3			0.4	3	
	CPE 221	Fundamentals of Fluid Mechanics	2	2	0	1	3	90		0.3	0.3			0.4	2	
	ERE 222	Thermo-Fluids Lab	1	2	0	0	2	45	CPE 223*	0.3	0.3			0.4	1	
	CPE 223	Thermodynamics.	2	0	0	2	2	90	ERE 222*			1			2	
5	LRA xxx	UR elective 2	2	2	0	0	2	90		0.3	0.3			0.4	2	19
	ENV 311	Seminar on ENV	2	2	0	0	2	90		0.75			0.25		0	
	ENV 312	Fundamentals of Environmental Engineering	3	2	2	0	4	135		0.3	0.3			0.4	3	
	ENV 313	Global Environmental Engineering	3	2	0	2	4	135		0.3	0.3			0.4	3	
	ENV 314	Water Quality and Analysis	3	2	0	2	4	135		0.3	0.3			0.4	3	
	ENV 315	Environmental Hydraulics	3	2	2	0	4	135		0.3	0.3			0.4	3	
	ENV 316	Municipal Solid Waste	3	2	2	0	4	135		0.3	0.3			0.4	3	

6	LRA xxx	UR elective 3	2	2	0	0	2	90		0.3	0.3			0.4	2	16
	ENV 321	Project Based Learning on ENV	2	0	0	4	4	90		0.3		0.5	0.2		2	
	ENV 322	Air Quality and Pollution	3	2	0	2	4	135		0.3	0.3			0.4	3	
	ENV 323	Urban Development and Environmental Planning	3	2	0	2	4	135		0.3	0.3			0.4	3	
	ENV 324	Waste Water Treatment	3	2	2	0	4	135	CHM111	0.3	0.3			0.4	3	
	ENV 325	Desalination Processes and Systems	3	2	2	0	4	135		0.3	0.3			0.4	3	
7	LRA xxx	UR Elective 4	2	2	0	0	2	90		0.3	0.3			0.4	2	17
	ENV 411	Ground Water Engineering	3	1	0	4	5	135		0.3	0.3			0.4	3	
	ENV 412	Sustainable Design and Technologies in Buildings	3	2	2	0	4	135	ENV321	0.3	0.3			0.4	3	
	ENV 413	Elective 1	3	2	2	0	4	135							3	
	ENV 414	Elective 2	3	2	2	0	4	135							3	
	ENV 415	Elective 3	3	2	2	0	4	135							3	
8	LRA 201	Introduction to Economics and Sustainable Development	2	2	0	0	2	90		0.3	0.3			0.4	2	17
	ENV 421	Clean Production Technologies	3	2	0	2	4	135	ENV 324	0.3	0.3			0.4	3	
	ENV 422	Environmental Impact Assessment and Legalization	3	2	0	2	4	135	ENV 314, ENV 322	0.3	0.3			0.4	3	
	ENV 423	Elective 4	3	2	2	0	4	135							3	
	ENV 424	Elective 5	3	2	2	0	4	135	MTH 211						3	
	ENV 420	Graduation Project (1)	3	0	0	12	12	135				0.7	0.3		-	
9	ENV 500	Graduation Project (2)	7	0	0	28	28	315				0.7	0.3		-	11
	ENV 499	Industrial Training (2 Modules)	4	0	0	20	20	180		0.7			0.3		-	
		Total	160	102	36	113	251	7200								160

Course Program Flowchart for Undergraduate Course of Environmental Engineering- ENV



ENV Flowchart

ENV ILOs Cross Mapping and assessment Tools

Code	Name		General Outcomes (a-k)											Specialization										Assessment tool																							
		Cr	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	HA	OJ	ME	FE	OP	PT	LBR	LBK	LE	PBR	PBK	ITR	ITP	MIE	GPR	GPK	OE	AT
University Requirements																																															
LRA 102	Introduction to Philosophy	2																					x		x	x																			
LRA 405	Key skills seminar (1)	2				x	x	x	x	x	x								x				x		x	x																			
LRA 401	Japanese Language (1)	1							x														x		x	x																			
LRA 402	Japanese Language (2)	1							x														x		x	x																			
LRA 406	Key skills seminar (2)	2				x	x	x	x	x	x								x				x		x	x																			
LRA 101	Japanese Culture	2				x	x																x		x	x																			
LRA 301	Environment and Earth Science	2								x	x												x		x	x																			
LRA 201	Introduction to Economics and Sustainable Development	2								x	x												x		x	x																			
LRA 202	Peace Studies	2								x	x	x											x		x	x																			
LRA 103	Fine Arts appreciation, drawing, and painting	2								x	x	x											x		x	x																			
LRA xxx	UR elective 1	2								x													x		x	x																			
LRA xxx	UR elective 2	2								x													x		x	x																			
LRA xxx	UR elective 3	2								x													x		x	x																			
LRA xxx	UR elective 4	2								x													x		x	x																			
Basic Science and Mathematics																																															
MTH 111	Mathematics (1) (Calculus + Linear Algebra)	3	x				x																x		x	x																			
PHY 111	Physics (1)	3	x	x			x																x		x	x																			
CHM 111	Chemistry (1)	2	x	x																			x		x	x																			
PHY 112	Basic Sciences Lab-1 (Physics (1))	1	x																																								x	
CHM 112	Basic Sciences Lab-2 (Chemistry (1))	1	x	x		x																																				x	
MCE 111	Mechanics (Statics + Dynamics)	3	x				x							x	x								x		x	x																		
MTH 121	Mathematics (2) (Calculus + Linear Algebra)	3	x				x							x									x		x	x																		
PHY 121	Physics (2)	3	x	x			x																x		x	x																		
CHM 121	Chemistry (2)	2	x	x																			x		x	x																		
PHY 122	Basic Sciences Lab-3 (Physics (2))	1	x																																								x	
CHM 122	Basic Sciences Lab-4 (Chemistry (2))	1	x	x		x																																				x	
MTH 211	Probability and Statistics	2	x				x							x									x		x	x																		
BIO 121	Fundamental of life Science	2	x																				x		x	x																		
Faculty Requirements (Basic Engineering)																																														
IME 111	Safety and Risk Management	2								x											x	x	x		x	x																		
EPE 211	Electrical Engineering (Circuits + Machines)	3	x			x	x						x	x	x								x		x	x																		
EPE 212	Electrical Engineering Lab (Circuits + Machines)	1	x								x	x	x										x						x	x	x												
IME 121	Engineering Drawing	3											x	x									x		x	x			x														
CSE 211	Computer Programming	2	x										x				x	x					x		x	x																		
CSE 212	Computer Programming Lab	1																					x						x	x	x											x	
CPE 213	Material and Energy Balance	3	x										x		x								x	x	x	x																	x	
CPE 211	Introduction to Energy, Environmental and Chem. Eng.)	3	x							x		x											x		x	x																		
CPE 212	Energy, Environmental and Chem. Eng. Lab	3	x	x		x																									x											x	
IME 211	Introduction to Manufacturing Processes	2	x				x		x				x								x		x						x													x	
IME 212	Manufacturing Processes Lab	1																					x						x		x											x	
EPE 221	Measurements and Instrumentations	2	x	x		x			x				x								x	x	x		x	x																		
EPE 222	Measurements and Instrumentations Lab	1	x																	x	x	x	x						x		x											x	
MSE 221	Fundamentals of Materials Science	2	x	x		x	x		x				x								x	x	x		x	x																		
MSE 222	Materials Science Lab	1	x	x		x	x		x				x								x	x	x						x		x											x	
CPE 221	Fundamentals of Fluid Mechanics	2								x	x											x	x		x	x																		
ERE 222	Thermo-Fluids Lab	1	x	x		x																	x						x		x											x	
CPE 223	Thermodynamics	2	x										x	x									x	x	x	x																	x	
Program Requirements																																															
ENV 311	Seminar on ENV	2							x		x	x	x								x	x	x	x			x																x	
ENV 312	Fundamentals of Environmental Engineering	3	x										x		x								x	x	x	x																	x	
ENV 313	Global Environmental Engineering	3				x								x									x	x	x	x																	x	
ENV 314	Water Quality and Analysis	3				x								x									x	x	x	x																	x	
ENV 315	Environmental Hydraulics	3			x		x								x	x			x				x	x	x	x																	x	
ENV 316	Municipal solid waste	3	x				x							x									x	x	x	x																	x	
ENV 321	Project Based Learning on ENV	2		x		x					x	x	x			x	x		x								x					x	x							x	x	
ENV 322	Air Quality and Pollution	3				x								x									x	x	x	x																	x	
ENV 323	Urban Development and Environmental Planning	3		x			x								x			x					x	x	x	x																	x	
ENV 324	Waste water treatment	3	x							x				x									x	x	x																			x	
ENV 325	Desalination Processes and Systems	3	x							x				x									x	x	x																			x	
ENV 411	Ground Water Engineering	3		x		x										x			x	x			x	x	x		x		x	x	x											x	
ENV 412	Sustainable Design and Technologies in Buildings	3			x					x					x							x	x	x	x	x																	x	
ENV 413	Elective 1	3			x		x							x									x	x	x																			x	
ENV 414	Elective 2	3			x		x							x									x	x	x																			x	
ENV 415	Elective 3	3			x		x							x									x	x	x																			x	
ENV 421	Clean Production Technologies	3						x		x							x						x	x	x	x																		x	
ENV 422	Environmental Impact Assessment and Legalization	3			x						x					x				x			x	x	x	x																		x	
ENV 423	Elective 4	3			x		x							x									x	x	x																			x	
ENV 424	Elective 5	3			x		x							x									x	x	x																			x	
ENV 420	Graduation Project (1)	3			x	x		x		x			x	x						x	x	x					x													x	x	x	x	
ENV 500	Graduation Project (2)	7			x	x		x		x			x	x						x	x	x					x													x	x	x	x	
ENV 499	Industrial Training (2 Modules)	4					x					x		x																															

ARTICLE-41: COURSE DESCRIPTIONS

COURSE DESCRIPTIONS

Environmental Engineering Core Courses

ENV 311 Seminar on ENV

Selected topics in environmental engineering will be offered during this course. Such as air and water pollution, water desalination, climate changes, environmental assessment, etc.

ENV 312 Fundamentals of Environmental Engineering

Introduction to Chemistry, Materials and Energy Balances, Ecosystems, Hydrology, Geological and Soil Resources, Water Quality and Air Pollution.

ENV 313 Global Environmental Engineering

Study of aspects of atmospheric composition, Simple models, Geochemical cycles, stratospheric chemistry, Tropospheric chemistry, photo physics with dynamics and relaxation of molecules and Global Environmental Issues Ozone depression.

ENV 314 Water Quality and Analysis

Study of drinking water standards, regulations - health effects - source water composition.

ENV 315 Environmental Hydraulics

Introduction to Environmental Hydraulics , hydraulics of pipes under pressure (water mains and networks), open channel flow (sewers, drains and channel sections), diffusion, dispersions, etc.

ENV 316 Municipal Solid Waste

Introduction to municipal waste, main techniques used, waste disposal, post treatment. Municipal Solid Waste Management; Generation and Characteristics of Waste, Health and Environmental Effects; Waste Collection, Storage and Transport. Record Keeping, Control, Inventory and Monitoring, Implementing Collection and Transfer System, Case Study-Waste Storage, Collection and Transport, Waste Disposal - Key issues and features, Sanitary Landfill, Waste Processing Techniques.

ENV 321 Project Based Learning on ENV

Students will be required to train the main techniques for solving environmental problems.

ENV 322 Air Quality and Pollution

Introduction to air pollution, air pollutants, air quality, heath of air. Types of Air Pollution control equipment. Aerodynamics and fluid resistance to particle motion. Particle and gas separation techniques (Gravity, momentum, Centrifugal Separators,

filters, scrubbers, electrostatic precipitators' absorbers, etc.). Design principles of air pollution control equipment. Industrial applications. Air pollution control in urban environment". Cost and design of control systems. Regulations, legal and economic aspects.

ENV 323 Urban Development and Environmental Planning

Introduction to urban planning, urban development, urban planning strategy, etc. Topics may include land and water utilization, transport, infrastructure planning, waste and recycling, and impacts on local and global environments. A systems approach integrating the physical, urban and social environment is emphasized. Means of incorporating environmental regulations and risk management into planning approaches are covered.

ENV 324 Waste Water Treatment

Study of improved techniques for the characterization of wastewaters-Unit processes of advanced biological wastewater treatment - trickling filter- activated sludge system - stabilization and aerated lagoon systems.

ENV 325 Desalination Processes and Systems

Study of theoretical and practical aspects of seawater/brackish water desalination technologies, including thermalbased Multi-Stage Flash distillation (MSF), Multi-Effect Distillation (MED), Vapor Compression VC and membrane-based Reverse Osmosis (RO), Nano Filtration (NF). Renewable and Nuclear – Desalination. Other Desalination Processes & Systems (FO, MD, CDI, SS, HDH ...)

ENV 411 Ground Water Engineering

Introduction, ground water analysis, reservoir analysis, ground water quality. The nature of groundwater and pollutants, then introduce the mechanism of chemical fate and transport in the underground. Also the course may include the principles, application and design for remediation techniques.

ENV 412 Sustainable Design and Technologies in Buildings

Introduction, of sustainable design, technologies in buildings and methods applications, green buildings, the process requires close collaboration of the construction engineers and the client and the architects in the entire construction project. Energy saving strategies and building environmental design.

ENV 421 Clean Production Technologies

Introduction to clean production, main techniques for clean production, green chemistry, etc. It is intended to minimize waste and emissions and maximize product output. By analyzing the flow of materials and energy in a company, student tries to identify options to minimize waste and emissions out of industrial processes through source reduction strategies. Improvements of organization and technology help to reduce or suggest better choices in use of materials and energy, and to avoid waste, waste water generation, and gaseous emissions, and also waste heat and noise.

ENV 422 Environmental Impact Assessment and Legalization

Study of EMS- Environmental Impact Assessment (EIA) as a Tool Environmental Issues-Steps and EIA Procedures- Problems and Potential Solutions- Evaluation Process.

Environmental Engineering Elective Courses

ENV413 Treatment of Hazardous Waste

This course covers the principles of integrated solid waste. Provides an overview of municipal solid waste (MSW), industrial waste and hazardous waste management, including design and economic analysis. Covers the planning and engineering principles needed to address the growing and increasingly intricate problem of controlling and processing the refuse (Hazardous waste) created by urban societies.

ENV414 Green Economy

In this course, concerns with introduces to the basic concepts, policy instruments and international frameworks of inclusive green economies. The path consists of some modules which are divided into smaller sections.

ENV415 Air Pollution Monitoring and Control

This is an introductory course to air pollution and technologies for its control covering a wide range of topics. In this course, participants will learn effects of air pollutants on human beings, materials and the environment, what their sources are, and their physical and chemical behavior in the atmosphere. As the course is intended for engineering students, special focus is placed on control technologies and future trends towards preventing air pollution.

ENV416 Health and Environmental impact of (Water-Energy-Food Nexus)

This course covers importance issues related to the food, energy, and water nexus and its implications for nutrition security, one health, environmental sustainability, and economic development will be described. Challenges associated with these issues will be evaluated and strategies to address them will be proposed.

ENV417 Alternative and future Energies Applications (Renewable and Nuclear Energies)

This course will cover the current production and utilization of energy, as well as the consequences of this use, examining finite fossil energy reserves, impacts on the environment and climate, and the social and economic impacts of our present energy and food production and use. This course will also cover the importance of creating a sustainable energy future for all societies including those of the developing world.

ENV418 Industrial Safety and Regulations

This course introduces the principles of industrial safety. Emphasis is placed on industrial safety and OSHA regulations. Upon completion, students should be able to demonstrate knowledge of a safe working environment and OSHA compliance.

ENV423 Modelling of the Built Environment

This course will develop knowledge of environmental modelling and building simulation tools for assessment of architectural projects relative to resource consumption, material attributes, thermal performance, quality of interior environments, and land use. Students will apply knowledge through the assessment of an architectural proposition and develop analytical and design skills in proposing alternative solutions towards sustainability in the built environment.

ENV424 Environmental Statistics and Modeling

This course is intended to give students introductory statistics previously, the fundamental knowledge, basic computing skills of data analysis and statistics, which are necessary to their future research such as: overview of environmental statistics, exploratory data analysis, regression methods, times series data analysis, spatial statistics, one-& Two-way, and factorial ANOVA, Censored data.

ENV425 Sustainable Materials in Buildings

This course covers the embodied energy, operational energy in building and life cycle energy. Ecological foot print, bio-capacity and calculation of planet equivalent. Role of material: Carbon from cement, alternative cements and cementitious material, alternative fuel for cements for reduction in carbon emission, sustainability issues for concrete.

ENV426 Cities and Climate Change

The course introduces the theme of climate change in urban areas. Also, it covers both how cities are affected by climate change and how cities are contributing to climate change. In addition, it looks at how climate change adaptation and mitigation can be considered in urban planning and identify concrete measures. Several examples of how cities can play a transformational role in addressing climate change will be presented.

ENV427 Water and Energy Conservation (in Different Sectors; Environmental Impact)

In this course, students will learn why resource conservation is so important. Also, students will gain insight how limited energy and water resources affect not only our communities but our businesses. They will be provided beforehand calculators to understand their current energy and water use. Students will also learn specific steps they can take in the home and office to conserve energy and water. Participants will be asked to make their own personal commitments to reducing energy and water.

ENV428 Ecological Design of Environmental Systems

An advanced survey course on the field of ecological design and engineering. Principles of design are illustrated with case studies from biologically-based waste treatment systems, ecosystem management and sustainable development. Concepts covered include ecology, ecological engineering, nutrient cycling, natural wastewater treatment, and design processes. Technologies include treatment wetlands, living machines, anaerobic digestion, algal turf scrubbers, and green walls/green roofs.