

# University of Mosul جامعة الموصل



## *First Cycle – Bachelor's Degree (B.Sc.) – Environmental Engineering*

بكالوريوس - هندسة البيئة



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## 1. Overview

This catalogue is about the courses (modules) given by the program of Environmental Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

### نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة البيئة للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية مع (6000) إجمالي ساعات حمل الطالب و 240 إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

## 2. Undergraduate Courses 2023-2024

### Module 1

Code	Course/Module Title	ECTS	Semester
ENV111	Calculus	8	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
5	0/0/0/2	108	92
Description			
This course introduces the students to the main topics of calculus. The course will cover Prerequisites for calculus, Limits, Continuity, and Differentiation (methods and applications), Integration, Applications of Definite Integrals, The Calculus of Transcendental Function, Techniques of Integration. At the end of the course, students will have a broad knowledge of the basic concepts, techniques and applications of differential and integral calculus. This will be achieved through theoretical lectures, tutorials and homework.			

### Module 2

Code	Course/Module Title	ECTS	Semester
ENV112	Engineering Drawing	8	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
1	0/5/0/0	93	207
Description			
The aim of this course is to help the students to use the technical drawing and performs drawing exercises with ruler, compass, T-square. make the student able to draw circles with			

straight lines, arcs and polygon. learns and applies dimensioning rules. knows the properties of cross section view and carry out the perspective drawings due to views.

This course has several components that include studying lectures, tutorial, discussion, homework, and e-learning platforms. The course will be taught in English, and all compulsory assignments have to be submitted within the deadlines to be admitted to the exam.

### Module 3

Code	Course/Module Title	ECTS	Semester
ENV113	Environmental Thermodynamics	4	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0/0/0/1	48	52
Description			
The primary strategy for delivering this module will be to encourage students to participate in the exercises while refining and expanding their critical thinking skills. This will be accomplished through classes, interactive tutorials, and the consideration of simple experiments involving sampling activities that students find interesting.			

### Module 4

Code	Course/Module Title	ECTS	Semester
ENV114	Computer Programming	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/0	63	87
Description			
تهدف هذا المادة الدراسية إلى تعليم الطلاب البرمجة بلغة فيجوال بيسك (Visual Basic 6 (VB6) حيث تساعد هذه اللغة الطلاب على فهم وكتابة بعض الشفرات والبرامج المحددة، كذلك تهدف هذه المادة الى توسيع مدارك الطلاب في فهم طبيعة عمل البرامج. يتضمن المنهاج الدراسي فهم بيئة التطوير المتكاملة لهذه اللغة البرمجية ونوافذها وهي النموذج و صندوق الأدوات ونافذة الخصائص ومستكشف المشروع ونافذة تخطيط النموذج وشريط القوائم وشريط الأدوات، بالإضافة الى أحداث الفارة (الماوس) ، ومربعات الحوار ، وأساسيات VB6 (مثل البيانات ، والثوابت) ، وعبارات التحكم والجمل الشرطية بالإضافة الى جمل الدوران.			

### Module 5

Code	Course/Module Title	ECTS	Semester
ENV115	Human Rights and Public Freedoms	2	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/0/0/0	33	17
<b>Description</b>			
تهدف دراسة هذه المادة الدراسية إلى تطوير فهم شامل لحقوق الإنسان والديمقراطية ومكافحة الفساد ، وتمكين الأفراد من تعزيز وحماية حقوق الإنسان والقيم الديمقراطية في المجتمع.			

#### Module 6

Code	Course/Module Title	ECTS	Semester
ENV116	English 1	2	1
<b>Description</b>			
This pre-Intermediate English course is designed to help students learn the skills involved in the writing process, applied grammar, and reading comprehension, and apply these skills to everyday English. Students will gain initial competence in writing a variety of sentence types, paragraphs, and a very basic essay, as well as in reading proficiently at an intermediate level in an academic setting. Students will gain confidence, acquire knowledge, think critically, and upgrade their skills in the three content areas to increase their success in future college courses.			

#### Module 7

Code	Course/Module Title	ECTS	Semester
ENV240	Engineering Mathematics	7	2
<b>Description</b>			
This course provides students with the fundamentals for Hyperbolic function, Catenary of cables, Polar coordinates, partial derivatives for Functions of two or more variables, Techniques of Integration and Multiple Integration.			

#### Module 8

Code	Course/Module Title	ECTS	Semester
ENV122	Engineering Mechanics	7	2

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
5	0/0/0/2	108	67
<b>Description</b>			
<p>The primary purpose of the study of engineering mechanics is to develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering. This capacity requires more than a mere knowledge of the physical and mathematical principles of mechanics; also required is the ability to visualize physical configurations in terms of real materials, actual constraints, and the practical limitations which govern the behavior of machines and structures. One of the primary objectives in a mechanics course is to help the student develop this ability to visualize, which is so vital to problem formulation. Indeed, the construction of a meaningful mathematical model is often a more important experience than its solution. Maximum progress is made when the principles and their limitations are learned together within the context of engineering application.</p>			

### Module 9

Semester	ECTS	Course/Module Title	Code
2	4	Principles of Environmental Engineering	ENV123
USWL (hr/sem)	SSWL (hr/sem)	Lect/Lab./Prac./Tutor	Class (hr/w)
37	63	2/0/0/0	2
<b>Description</b>			
<p>الهدف من المقرر الدراسي هو تعريف الطالب بالمبادئ الرئيسية لهندسة البيئة وكل ما يخص التلوث البيئي : مقدمة عن البيئة والتلوث البيئي العوامل التي أدت إلى تدهور البيئة أنواع التلوث (تلوث الماء .تلوث الهواء . التلوث الضوضائي .تلوث حراري . التلوث الحراري، تلوث المياه مصادر المياه وخصائصها ،الخواص الكيميائية والفيزيائية للماء نوعية المياه ،تلوث المياه السطحية ومصادر ها ، تلوث المياه الجوفية ومصادره، معاملة المياه لأغراض الشرب مع جدول بالوحدات وشرح مختصر لكل وحدة، معالجة وطرح مياه الفضلات، خصائص مياه الفضلات، هدف المعالجة، مخطط وحدات معالجة مياه الفضلات معالجة وطرح مياه الفضلات خصائص مياه الفضلات، هدف المعالجة، مخطط وحدات معالجة مياه الفضلات مع إجراء زيارات موقعيه للتعرف على وحدات المعالجة والمشاريع البيئة المقامة وقيد التنفيذ.</p>			

### Module 10

Code	Course/Module Title	ECTS	Semester
ENV124	Environmental Geology	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0/0/0/0	33	42
<b>Description</b>			
<p>This course aims to introduce the students to the category of Environmental Geology. Geology –is the study of the earth, its materials and their properties, its internal and external physical, chemical, and biological properties, and its history. Environment – anything, living or nonliving that surrounds and influences living organisms. Environmental Geology – the application of geology to environmental concerns. This will be achieved through descriptive lectures.</p>			

**Module 11**

Code	Course/Module Title	ECTS	Semester
ENV125	Statistics	4	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	0/0/0/0	48	27
Description			
<p>There is a need to know how to deal with a large amount of data. The objectives of this module is how to generate informative data and how to extract information from data and to explain the valuable methods to present these data and extract the conclusions from them. Additionally, the module include how to describe the data in a clear manner.</p>			

**Module 12**

Code	Course/Module Title	ECTS	Semester
ENV126	Drawing by Computer	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/0	63	62
Description			
<p>There is a need to know how to deal with a large amount of data. The objectives of this module is how to generate informative data and how to extract information from data and to explain the valuable methods to present these data and extract the conclusions from them. Additionally, the module include how to describe the data in a clear manner.</p>			

**Module 13**

Code	Course/Module Title	ECTS	Semester
ENV211	Fluids Mechanics	8	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0/2/0/1	108	92
Description			
<p>Fluid mechanics deals with the fluid while it is in its static and motion conditions, as the curriculum deals with the basic principles and laws derived on the basis of these principles that govern the fluid in each case. The focus is on the fluid, which is in its liquid state, especially</p>			

water, as the environmental engineer deals with water in various engineering aspects in the applied field. The application of the laws is clarified through various mathematical examples with their illustrations, after the mathematical formulas for these laws are derived. The curriculum also includes deepening the understanding and assimilation of the theoretical side through practical application by conducting laboratory experiments on a number of the main topics of the subject.

#### Module 14

Code	Course/Module Title	ECTS	Semester
ENV212	Environmental Chemistry	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	0/2/0/0	78	47
Description			
<p>The aim of this course is to introduce the students to the area of environmental chemistry. The course will cover the chemistry of the air, water and soil and examine the environmental fate of anthropogenic chemicals released into the environment. This course employs the chemical principles to be used to explain and predict reactions, partitioning, and concentrations of anthropogenic chemicals in different environmental compartments. The course also emphasizes the impact of common pollutants on humans, animals, plants and the nonliving parts of the earth. Then, it will consider possible green chemistry, engineering and societal approaches to mitigating deleterious effects of pollution. The course will be beneficial to chemists, chemical and environmental engineers, and environmental scientists.</p>			

#### Module 15

Code	Course/Module Title	ECTS	Semester
ENV213	Concrete and Building Technology	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	0/2/0/0	93	57
Description			

This course is aimed principally at university and college students who wish to understand the concrete for the purpose of using it in professional practice. The students must take sufficient care to ensure the selection of correct ingredients, for concrete making to achieve a suitable mix, and to obtain a technically sound execution of concrete works. They must also have an intimate knowledge of the interaction between the different components that go into making concrete, whether in a fresh state or in a hardened state.

Moreover, this course gives principles of building systems, construction methods and techniques, starting from the idea, feasibility study, preparation of plans, methods of implementation, and excavation. Besides that, the equipment and methods of transporting and compacting of concrete, and an explanation of masonry units with their properties and methods of construction with them. The course covers the structural as well as finish works.

### Module 16

Code	Course/Module Title	ECTS	Semester
ENV214	Strength of Materials	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	0/0/0/2	63	62
Description			
<p>This course is a study of the effect of external loads on structural elements and the behavior of the elements under these loads. Determination of different types of stresses, strains and the relation between them, calculation of stresses in thin-walled pressure vessels, drawing shear and bending-moment diagrams of beams, calculation of bending and shear stresses in beams, and calculating deflections in beams using double integration method are explained in details. The course aims to expand the student's understanding of the structural elements behavior under different loads- that is essential to design and evaluate any structural member.</p>			

### Module 17

Code	Course/Module Title	ECTS	Semester
ENV215	Remote Sensing and GIS Applications	4	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/2/0/0	63	37
Description			
<p>ان الهدف الرئيس من تدريس هذه المادة في قسم هندسة البيئة هو لتزويد الطلبة بالمادة العلمية الاساسية التي تمكنهم من المشاركة في التدريبات الهندسية التي تتعلق بتطبيقات نظم المعلومات الجغرافية في مجال هندسة البيئة، مع تحسين مهارات التفكير النقدي لديهم وتوسيعها في نفس الوقت. ولتقديم لمحة عامة عن المبادئ الفيزيائية للتحسس النائي وتعريف الطالب بمعالجة بيانات التحسس النائي وتطوير تطبيقات لإدارة موارد الأرض ومراقبتها. وكذلك هدف هذه المادة الى تنمية مهارات</p>			



محددة في استخدام برامج التحليل المكاني والتحسس النائي المستخدمة في البحث الجغرافي. وكيف يمكن تطبيق فهم كل هذه على مجموعة من التطبيقات البيئية، كيفية انشاء قاعدة بيانات التقييم الالي للمرئيات الفضائية والتحليل المكاني ومن ثم انشاء خارطة بيئية لمواقع التلوث وادخال البيانات الوصفية للمعالم الارضية.

#### Module 18

Code	Course/Module Title	ECTS	Semester
ENV216	English 2	2	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0/0/0/0	33	17
Description			
<p>This pre-Intermediate English course is designed to help students learn the skills involved in the writing process, applied grammar, and reading comprehension, and apply these skills to everyday English. Students will gain initial competence in writing a variety of sentence types, paragraphs, and a very basic essay, as well as in reading proficiently at an intermediate level in an academic setting. Students will gain confidence, acquire knowledge, think critically, and upgrade their skills in the three content areas to increase their success in future college courses.</p>			

#### Module 19

Code	Course/Module Title	ECTS	Semester
ENV221	Water Quality Engineering	7	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3.0	0/2/0/0	78	97
Description			
<p>The aim of this course is to introduce the students to basic concepts on Water Quality Engineering. The course will cover water resources, principal sources of water pollution, Water Quality Management (rivers, lakes and groundwater) , Water quality criteria and standards, Laws and Regulations, Mechanism of pollutant fate in the environment, Modeling of water quality in natural systems. The Lab part : the main goal of this part is to equip students with the expertise and skills necessary for monitoring water quality and analyzing it quantitatively. Also, it incorporates the chemical concepts necessary for managing water quality and reducing pollution. At the end of the course, students will learn how to analyze different water samples and will acquire the necessary expertise and skills to monitor and analyze water quality. This will be achieved through lectures, laboratories and tutorials.</p>			

#### Module 20

Code	Course/Module Title	ECTS	Semester
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ENV231	Engineering Surveying	6	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/sem)</b>
3	0/3/0/0	93	57
<b>Description</b>			
<p>This course aims to introduce the students to the category of Engineering surveying. Introductory and definitions, which are used in plane surveying: Instruments for measuring distance obstacles in measurements Instruments for setting out right angles, Tape corrections. Leveling, Areas, and volumes. Computation of volumes. The Theodolite and Traverse surveying. Tachometry. Curves. Total instrument station, GPS field procedure. This will be achieved through descriptive lectures.</p>			

### Module 21

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
ENV223	Hydraulics Applications	4	4
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/sem)</b>
3	0/0/0/1	61	39
<b>Description</b>			
<p>The aim of this course is to introduce the students to the applications of hydraulics in environmental engineering. The course will cover the Open channel flow, non-uniform flow in open channels, Flow measurement and hydraulic control points, Pressure Surges "Water Hammer", and hydraulic similarity. At the end of the course the students will be able to use the hydraulic principles to solve problems associated with environmental engineering and design of unit processes for water and wastewater treatment plants. This course has several components that include lectures, individual &amp;, and e-learning platforms.</p>			

### Module 22

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
ENV224	Engineering Hydrology	3.0	4.0
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/sem)</b>
3.0	0/0/3/0	48	27
<b>Description</b>			
<p>The aim of this course is to introduce the students to the area of hydrological processes and practices including introduction to Hydrology. The course will cover discussion of the basic physical principles of the water cycle, different climate factors and components (evaporation, condensation, precipitation, runoff, stream flow). At the end of the course the students will have a working knowledge for estimating Precipitation in different methods as well as Abstraction from Precipitation, Stream flow Measurement, Run-Off, Hydrograph, and Flood Routing and have the skills of analytical skills (analyze data collected in the field and examine the results) and Communication skills (prepare detailed reports that document their research methods and findings). This will be achieved through descriptive</p>			

lectures with Preparing hydrological reporting and supervised tutorials.

### Module 23

Code	Course/Module Title	ECTS	Semester
ENV225	Engineering and Numerical Analysis	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	0/0/0/1	63	62
Description			
<p>Differential equations have wide applications in various engineering and science disciplines. In general, modeling variations of a physical quantity, such as temperature, pressure, displacement, velocity, stress, strain, or concentration of a pollutant, with the change of time <math>t</math> or location, such as the coordinates <math>(x, y, z)</math>, or both would require differential equations. Similarly, studying the variation of a physical quantity on other physical quantities would lead to differential equations. It is important for engineers to be able to model physical problems using mathematical equations, and then solve these equations so that the concerned can be studied.</p>			

### Module 24

Code	Course/Module Title	ECTS	Semester
ENV226	Microbiology	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0/2/0/0	63	62
Description			
<p>To enhance the understanding of microbial function in engineered systems, initially students are supposed to learn how to deal with different types of microorganisms and it's useful in designing wastewater and water treatment plants. Also microorganisms play an important role in the protection of humans, animals, plants, air, soil, and engineering systems from chemical or biological pollution, deterioration, and corrosion, and in the restoration of polluted and degraded environments.</p>			

### Module 25

Code	Course/Module Title	ECTS	Semester
ENV311	Principles of Air pollution	6.0	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3.0	0/0/0 / 1.0	63	87

Description
The aim of this course is to define the atmosphere and air pollution effects. The course will cover classification of air pollutants, their sources and concentrations, Relationship between air pollution and meteorology, mathematical models of dispersion (Gaussian Plume Dispersion model, point source, line source, area (box) model). Furthermore, indoor air quality model, its sources and emission modeling (radon model). Upon completion of this course students will be able to: Knowing the air pollution origins, types, causes, dispersion, and modeling.

#### Module 26

Code	Course/Module Title	ECTS	Semester
ENV312	Water Networks	7	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	0/0/0/1	63	112
Desc ENVription			
<p>The course aims to describe the main components of water supply network system including water pipes network, pump station, and service storage tanks, also it describes all parameters that correlate with network such as valves, pipe materials, loads exerted on pipes. The course covers the methods that used in analysis and design of the main components of water supply network system, and learns the necessary principles of network maintenance and rehabilitation. The course will be covered by class room lectures; three hours each week for explaining the materials with giving examples, and one hour for tutorials problems. Explanation on necessary computer software will be given and a project on an actual network will be submitted by one student or group</p>			

#### Module 27

Code	Course/Module Title	ECTS	Semester
ENV313	Solid Waste Management	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0/0/0/1	78	72
Description			
<p>The course would cover-general introduction including definition of municipal solid waste; legal issues and requirements for solid waste management; sampling and characterization of solid waste; analysis of solid waste constituents; health and environmental issues related to solid waste management; steps in solid waste management including solid waste reduction at source, collection techniques, materials and resource recovery/recycling, transport, optimization of solid waste transport, treatment and disposal techniques (composting, incineration, refuse derived fuels, landfilling).</p>			

#### Module 28

Code	Course/Module Title	ECTS	Semester
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ENV314	Noise and Thermal Pollution	3	5
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/sem)</b>
3	0/0/0/0	48	27
<b>Description</b>			
<p>With increasing noise pollution nationally and globally, it is necessary to be familiar with basic information regarding noise pollution to allow proper assessment of impacts arising from the various projects or activities and devising appropriate mitigation or control measures. In this respect, the Noise Pollution course covers sources, characteristics and effects of industrial, transportation and urban noise; measurement, assessment and evaluation of noise; control of noise and protection of recipients. Students also will learn the different Sources of Thermal Pollution: Coal-fired Power Plants, Industrial Effluents, sewage effluent and their effects on human and environment, detailed design of cooling ponds and towers. This course has several components that include lectures, individual &amp; group assignments, e-learning platforms. Exercises involving the use of computer applications tools to understand different techniques used in control of Noise and thermal Pollution.</p>			

#### Module 29

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
ENV315	Soil Mechanics	6	5
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/sem)</b>
4	0/3/0/0	108	42
<b>Description</b>			
<p>This course aims to introduce the students to the category of Soil mechanics which is the application of laws of mechanics and hydraulics to engineering problems dealing with sediments and other unconsolidated accumulations of solid particles produced by the mechanical and chemical disintegration of rocks regardless of whether or not they contain an admixture of the organic constituent. This will be achieved through descriptive lectures.</p>			

#### Module 30

<b>Code</b>	<b>Course/Module Title</b>	<b>ECTS</b>	<b>Semester</b>
ENV316	English 3	2	5
<b>Class (hr/w)</b>	<b>Lect/Lab./Prac./Tutor</b>	<b>SSWL (hr/sem)</b>	<b>USWL (hr/sem)</b>
2	0/0/0/0	33	17
<b>Description</b>			
<p>Overview of Academic Essay: Independent, Dependent, and Integrated essays, Structure of academic essays, identifying topic sentence and thesis statement of academic essays, Identifying the main ideas of academic essays, Identifying the supporting details, essays outline using ideas maps, responding to essay questions by making personal notes. Writing a thesis statement or topic sentence, writing main ideas and supporting details using personal thoughts. Buddling an idea map of an essay question,</p>			

Transition words and sentence starters. Writing a whole essay: Introduction, body and conclusion paragraph.

### Module 31

Code	Course/Module Title	ECTS	Semester
ENV321	Air Pollution Control	5.0	6.0
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3.0	0/0/0/1	63	62
Description			
<p>The aim of this course will cover air pollution equipment's control. Initially students will learn how to apply the basic principles of sciences and engineering to solve issues associated with air pollution basics and control. Upon completion of this course students will be able to: Apply the treatment practices and devices due to the types of pollutants; Understand the design procedures for any type of air pollutant through assignments that demonstrate accomplishment of this outcome, and test problems and tutorials.</p>			

### Module 32

Code	Course/Module Title	ECTS	Semester
ENV322	Sewers Networks	7	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0/0/0/1	78	97
Description			
<p>The course aims to describe the quantity and quality properties of wastewater and storm water, and learns the engineering methods used in the analysis and design of sanitary sewers networks, storm sewers networks, and plumbing networks. The course covers describing the main appurtenances of sewers networks in addition to domestic plumbing networks.</p> <p>The course will be covered by classroom lectures; four hours each week for explaining the materials with giving examples, and one hour for tutorial problems. Explanation on necessary computer software will be given and a project on an actual network will be submitted by one student or group.</p>			

### Module 33

Code	Course/Module Title	ECTS	Semester
ENV323	Unit Operations & Processes	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
4	0/0/0/1	78	72

Description
<p>The emphasis in lectures is on the chemical, physical, and biological unit processes that used in the professional practice of environmental engineering (water treatment, wastewater treatment, and soil remediation). The study of various physical, chemical and biological operations and processes Topics covered will be selected from areas such as reactor hydrodynamics, oxidation-reduction, coagulation-flocculation, chemical precipitation, ion exchange, adsorption process, biological oxidation, anaerobic digestion, activated sludge. The course will emphasize incorporating sustainability into design, with emphasis on reducing energy consumption and environmental impacts while increasing operations ease. The emphasis in homework assignments is for students to appreciate the role of each treatment unite in treatment train and then to recommend specific design criteria given different treatment goals and challenges. Upon completion, students should be able to describe the purpose and major design elements of each step of a conventional water and wastewater treatment plant. Students should also be able to compile basic knowledge about unit operation processes and to evaluate new technologies and make critical judgments as to their application and sustainability based on gained knowledge.</p>

#### Module 34

Code	Course/Module Title	ECTS	Semester
ENV324	Sustainability Engineering	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	0/0/0/0	48	52
Description			
<p>This course aims to introduce the students to the sustainability concept, and the principles of sustainable development. Also how they can exchange the different activities within sustainability concept !! Also this course deals with the environmental impact of the concrete from a variety of viewpoints: the concrete constituents themselves, the application of wastes and by-products, and the use of natural materials of low environmental impact. It thus provides a sound basis for developing and application of ecologically friendly concretes. Another purpose of this course is to make the students aware of the technical possibilities for recycling of demolished concrete and masonry. This course as well exposes students to a broader range of types of new and renewable energies as sun energy (photocells, heating, salt lagoon), wind energy, waterfalls energy, gravity energy, the practical methods to use.</p>			

#### Module 35

Code	Course/Module Title	ECTS	Semester
ENV325	Hazardous Waste Management	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	0/0/0/0	48	52
Description			
<p>This course provides an in-depth understanding of solid and hazardous waste characteristics and management. Some basics of radioactive waste characterization and handling are also provided. It is</p>			

Involving The study of the source, generation rates, and characteristics of hazardous wastes and their regulation, handling, treatment, and disposal. The Course will emphasize on engineering process design, analysis and evaluation of different hazardous waste treatment technologies. Students will have the opportunity to study issues, processes, and problems involved in current hazardous waste treatment and management systems.

### Module 36

Code	Course/Module Title	ECTS	Semester
ENV326	Reinforced Concrete	4	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/0/0/1	48	52
Description			
<p>This course is an introduction to the analysis and design of reinforced concrete structural members. Topics covered will include working stress methods for beams subjected to flexural bending and shear stresses. The course also, covers the analysis and design of beam using ultimate method According to ACI Code for shear stresses and flexure moments. The analysis and design of doubly reinforced concrete beams is also included. The course extended to cover the design of reinforced concrete short columns subjected to axial load and bending moment. Design and analysis of eccentrically loaded columns and using the interaction diagram will be a part of this course.</p>			

### Module 37

Code	Course/Module Title	ECTS	Semester
ENV411	Design of Water Treatment Units	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	0/0/0/1	63	87
Description			
<p>The aim of this course is to introduce the students to the area of water treatment facilities used in the Water Treatment Plant (WTPs) and its design. The course will cover the conventional and advanced Water Supply Treatment Units Operation and Process focusing on the design of these units, in addition to the sludge treatment and handling facilities. At the end of the course the students will have a working knowledge of the Drinking water treatment units and have the skills to perform a complete process design of a water treatment plant. This will be achieved through descriptive lectures with design projects and supervised tutorials</p>			

### Module 38

Code	Course/Module Title	ECTS	Semester
ENV412	Wastewater Treatment Plant Design	7	7



Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0/0/0/1	78	97
<b>Description</b>			
<p>The aim of this course is to introduce the students to the area of wastewater treatment plant operation and design. The course will cover wastewater treatment plant units' train, focusing on the design of preliminary, primary, secondary, and tertiary treatment processes in addition to the sludge treatment and handling facilities. At the end of the course the students will have a working knowledge of the wastewater treatment units and have the skills to perform a complete process and hydraulic design of a treatment plant. This will be achieved through descriptive lectures with design projects and supervised tutorials. This course has several components that include lectures, individual &amp; group assignments, field visits and e-learning platforms. Exercises involving the use of computer applications tools to understand specific unit processes.</p>			

### Module 39

Code	Course/Module Title	ECTS	Semester
ENV413	Structural Design	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	0/0/0/2	93	82
<b>Description</b>			
<p>An introduction to the reinforced concrete structure and foundation engineering, Characteristics of reinforced concrete elements, Concrete types, Steel Grades, and Loading types. Design of different structural elements subjected to flexure and shear using load and resistance factor design method (LRFD). Design of continuous one-way slabs and beams using ACI coefficients method. Design of two-way slabs using coefficients method. Bearing capacity and foundation types, and analysis and design of wall, spread, and raft footings. Structural design of liquid retaining structures using PCA method, and the design of reinforced concrete retaining Walls. The topics will be covered according to the American Building Code.</p>			

### Module 40

Code	Course/Module Title	ECTS	Semester
ENV414	Engineering Project Management and Economy	4	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
4	1/0/0/0	78	47
<b>Description</b>			
<p>This course covers the fundamental concepts and applied techniques to manage project resources</p>			

effectively and deliver on schedule. Course content addresses fundamental methods for planning, scheduling, organizing, controlling projects. Though project management is universally applicable. Student will learn project management principles and methods with special focus on planning, controlling, and managing projects. Course topics will primarily be the technical aspects of project management Examples include developing the project plan; schedules, and the critical path, resources and resources levelling, MS Project software, S-Curve and cash flow & Evaluating Project cost and schedule performance (Earned Value). Furthermore. This course also, covers the principles of project evaluation; analysis of capital and operating costs of engineering alternatives, benefit-cost ratio; break-even studies, evaluations recognizing risk, replacement and retirement of assets; tax considerations, influence of sources of funds.

#### Module 41

Code	Course/Module Title	ECTS	Semester
ENV415	Engineering Project and Technical Writing	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	0/0/0/2	48	27
Description			
<p>The aim of the first part of this course is technical writing which includes developing students' knowledge and understanding of the role and conduct of descriptive research methods. Intellectual and methodological debates will be discussed in order to assist students to develop informed opinions and a critical appreciation for other's research. The imperative for ethical research practice will be presented. The course equips students with the skills to review and conduct methodologically sound research as a part of their professional work. Students develop the skills to recognize and reflect on the strengths and limitations of different research methodologies, understand the links between theory and practice, critically assess research, and address ethical and practical issues.</p> <p>The aim of the second part of this course is executing a project which includes applying the principles of design relating to the subject of concern project. Then the student will apply the basics that have been learned in the first part in the writing the project that will submitted.</p>			

#### Module 42

Code	Course/Module Title	ECTS	Semester
ENV416	English 4	2	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/0/0/0	33	17
Description			

Overview of Academic Essay: Independent, Dependent, and Integrated essays, Structure of academic essays, identifying topic sentence and thesis statement of academic essays, Identifying the main ideas of academic essays, Identifying the supporting details, essays outline using ideas maps, responding to essay questions by making personal notes. Writing a thesis statement or topic sentence, writing main ideas and supporting details using personal thoughts. Building an idea map of an essay question, Transition words and sentence starters. Writing a whole essay: Introduction, body and conclusion paragraph.

### Module 43

Code	Course/Module Title	ECTS	Semester
ENV421	Industrial and Petroleum Liquid Waste	6.0	8.0
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3.0	0/0/4/1	63	87
Description			
<p>The aim of this course is to define the characteristics of industrial wastewater, manufacturing processes, and management strategies for pollution prevention and waste minimization; In-plant survey; Identifying wastewater generating operations; Preparing mass balance, calculations for industrial operations, In-plant control; Industrial water conserving and recycling. The course will cover Industrial wastewater treatment technologies (Equalization, Floatation, Neutralization, Microfiltration), Studying of selected wastewater industries and wastewater treatment.</p>			

### Module 44

Code	Course/Module Title	ECTS	Semester
ENV422	Soil and Groundwater Pollution	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	0/2/0/0	63	62
Description			
<p>Knowledge of the behavior of compounds in soil and their effects on organisms (human beings, plants, soil biota) is required in order to assess soil quality and to select proper soil remediation methods in case of severe pollution. The field of application is not limited to soil but includes sediments and solid wastes. The course focuses on soil risk assessment (soil quality evaluation) and the basic knowledge necessary to be able to apply a risk assessment procedure to polluted soil sites. Basic knowledge comprises compound behavior in soils (speciation, transport, uptake) and effects on soil organisms (bioavailability, uptake, dose-response relationships, risk assessment). Speciation focuses on adsorption to soil particles and on complexation reactions: mechanism and modeling, especially of heavy metals</p>			

with (dissolved) organic matter.

#### Module 45

Code	Course/Module Title	ECTS	Semester
ENV423	Estimation and Specifications	4	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/0/0/1	48	52
Description			
<p>This course provides a comprehensive understanding of the role of an Estimation in the construction industry. Students will learn the principles, techniques, and practices involved in, with a specific focus on estimation of construction projects element. The course covers quantity &amp; cost estimation. The course covers the rough and detailed quantity survey. Measuring soil excavation, volume of concrete, masonry work, RC shuttering, RC steel quantity, construction finishing, sanitary and plumbing element are also covered. The course extended to use the excel in estimation. The Bill of quantity, Pricing and cost analysis, project condition and specification are also included in this course. Practical exercises and case studies are included to enhance learning and application of concepts.</p>			

#### Module 46

Code	Course/Module Title	ECTS	Semester
ENV424	Environmental Impact Assessment and Regulations	4.0	8.0
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2.0	0/0/ 2.0/0	33	67
Description			
<p>The aim of this course is to define Environmental protection Act, Rules and Standards, EIA guidelines and predict the environmental consequences of human development activities and to plan appropriate measures to eliminate or reduce adverse effects and to augment positive effects. EIA aims to facilitate sustainable development. The course will cover Project Concept / Identification, Project Appraisal and Decision. At the end of the course the students will have a knowledge of the EIA and have the skills to perform a complete analysis and report that can be understood by all the related stakeholders. This will be achieved through descriptive lectures with project assignments.</p>			

#### Module 47

Code	Course/Module Title	ECTS	Semester
ENV425	Civil Drawing	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0/3/0/0	78	72

### Description

Using AutoCAD to produce technical drawings utilizing the knowledge from past design subjects. The course aims to introduce the technical drawings and format, the structural drawings of different elements like slabs, beams, footings. In addition, the subject will tackle the technical drawings of plumbing. The final goal is for the students to be able to produce technical drawings to interpret the designs carried out by the students.

This course has several components that include lectures, individual assignments, and e-learning platforms. The course will be taught in English, and all mandatory assignments have to be submitted within the deadlines to be admitted to the exams.

### Module 48

Code	Course/Module Title	ECTS	Semester
ENV426	Engineering Project	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
0	0/0/0/2	33	92

### Description

The aim of this course is executing a project which includes applying the principles of design relating to the subject of concern project. Then the student will apply the basics that have been learned in the writing the project that will be submitted. This course has several components that include group team project, field visits and e-learning platforms to guide and follow up the students in applying basic concepts of sciences and engineering to solve issues associated with subject of project. Project may involve the use of computer applications tools to design the project items. At final the student will submit the project as report and he present it orally.

### Contact

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