



Ajloun National University

جامعة عجلون الوطنية

Faculty of Engineering

Department of Civil Engineering

**Study Plan for the Bachelor's Degree
in Civil Engineering
Academic year 2023/2024**



Ajloun National University

جامعة عجلون الوطنية

Vision

Provide high-quality education in the field of civil engineering and active participation in community service.

Mission

Graduating qualified civil engineers who are able to participate in the real sustainable development in their communities by providing high-quality engineering education, in addition to serving the local community by actively contributing to scientific research, knowledge exchange, engineering consultations and professional activities.

Goals

1. Provide students with basic scientific knowledge and teach students on the principles and methods of using basic sciences in solving engineering problems.
2. Providing distinguished engineering education that combines knowledge and theory by training students on the use of laboratory equipment and conducting tests related to civil engineering, in addition to field training.
3. Develop students' analytical and design skills, including the ability to formulate engineering issues, work in a team, and develop their communication skills.
4. Graduating qualified civil engineers to work successfully in all fields of civil engineering and able to keep pace with contemporary developments.
5. Enhance graduates' understanding of responsibilities, ethical and professional values.
6. Active participation in scientific research and employing this to serve and solve the problems of the local community



Ajloun National University

جامعة عجلون الوطنية

Learning Outcomes

Knowledge

Apply fundamental knowledge of mathematics, science, and engineering to solve problems related to civil engineering

Design and conduct experiments, as well as analyze and interpret data in the interdisciplinary arena of civil engineering

Design the fundamental components of a system or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, constructability, and sustainability

Skills

Function on multi-disciplinary teams

Identify, formulate, and solve civil engineering problems

professional and ethical responsibilities of engineers the Understand the importance of

Competencies

Understand the impact of civil engineering solutions in a global, economic, environmental, and societal context.

Recognize the need for, and engage in, lifelong learning.

A knowledge of contemporary issues in the civil engineering industry.

Use the techniques, skills, and modern engineering tools necessary in civil engineering practice.



Ajloun National University

جامعة عجلون الوطنية

Contents of the Study Plan

The study plan for the bachelor's degree in Civil Engineering and of (164) credit hours distributed as follows:

- Certified On Campus learning (1+1, An hour and a half of on campus learning + one half hour of campus learning).
- Certified Electronic (1+1, An hour and a half synchronous Electronic + campus learning).
- Certified Blended (1+1, An hour and a half synchronous Blended + campus learning).

| Number | Type of Requirement | Credit Hours | percentage% |
|--------|------------------------------------|--------------|-------------|
| First | Faculty Requirements | 21 | 12.8% |
| Second | University Requirements | 44 | 26.8% |
| Third | Department Compulsory Requirements | 78 | 47.5% |
| | Department Elective Requirements | 18 | 10.9% |
| Fourth | Elective Free Requirements | 03 | 1.8% |
| Total | | 164 | 100% |

نظام الترميز المعتمد في الجامعة

Faculty Code Department Code (Level Year) Knowledge Area Course sequence

5 **02** **2** **2** **1**



Ajloun National University

جامعة عجلون الوطنية

Knowledge Area

| Knowledge Number | Knowledge Area | Number of Credit Hours |
|------------------|--|------------------------|
| 0 | General | 44 |
| 1 | Geotechnical Engineering | 11 |
| 2 | Structural Analysis | 16 |
| 3 | Structural Design | 12 |
| 4 | Transportation and Surveying Engineering | 12 |
| 5 | Water Resources Engineering | 15 |
| 6 | Environmental Engineering | 6 |
| 7 | Economy and Construction Management | 6 |
| 8 | Engineering Training | 3 |
| 9 | Graduation Projects | 3 |



Ajloun National University

جامعة عجلون الوطنية

First: University Requirements (27) Credit Hours

A. University Compulsory Requirement (12) Credit Hours

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|--------------------------------------|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 704107 | Entrepreneurship and Innovation | 1 | | | √ | |
| 704109 | Leadership and Social Responsibility | 1 | | | √ | |
| 704116 | Life Skills | 1 | | | √ | |
| 704117 | English Language Skills (1) | 2 | 714099 | √ | | |
| 704118 | Arabic Language Skills (1) | 2 | 704099 | | √ | |
| 704119 | National Education | 2 | - | | √ | |
| 704200 | Military Sciences | 3 | - | √ | | |

B. University Elective Requirements (9) Credit Hours

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|--|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 201101 | The Law in our Lives | 3 | | | √ | |
| 202132 | Human Rights | 3 | | | √ | |
| 401100 | Principles of Administration | 3 | | | √ | |
| 701140 | Arab Library and Lexicography | 3 | - | √ | | |
| 704103 | International and Arab Contemporary Issues | 3 | | | | √ |
| 704104 | Islamic Culture | 3 | - | √ | | |
| 704108 | Integrity and Transparency | 3 | | | √ | |
| 704110 | Digital Culture | 3 | | | √ | |
| 704112 | Arabic Language Skills (2) | 3 | 704118 | | √ | |
| 704113 | Art of Rhetoric and Dialogue | 3 | | | | √ |
| 704115 | Development and Family Planning in Islam | 3 | | | √ | |
| 704141 | History of Jerusalem | 3 | | | √ | |
| 704151 | Computer Skills (1) | 3 | 724099 | | √ | |
| 704152 | Computer Skills (2) | 3 | 704151 | | √ | |
| 704163 | Foreign Language other than English | 3 | | | √ | |
| 704172 | Sports and Health | 3 | | | | √ |



Ajloun National University

جامعة عجلون الوطنية

Second: Faculty Requirements (44) Credit Hours

A. Compulsory Faculty Requirements Credit Hours (31) Hours

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|---|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 311107 | Programming fundamentals for Engineering Students | 3 | 128099 | | | √ |
| 502102 | General Physics (1) | 3 | - | | √ | |
| 502106 | General Physics (2) | 3 | 502102 | | √ | |
| 502107 | General Physics Lab | 1 | - | | | √ |
| 502108 | General Chemistry | 3 | - | | √ | |
| 502109 | General Chemistry Lab | 1 | - | | | √ |
| 502201 | Engineering Mathematics | 3 | 601102 | | √ | |
| 502203 | Probability and Statistics for Engineers | 3 | 601102 | | √ | |
| 502300 | Technical Writing and Engineering Ethics | 2 | 704117 | √ | | |
| 502372 | Numerical Analysis Methods | 3 | 601102 | | √ | |
| 601101 | Calculus (1) | 3 | - | | √ | |
| 601102 | Calculus (2) | 3 | 601101 | | | √ |

Third: Faculty Compulsory Course Requirements in the field of Basic Engineering Science (13) Credit Hours

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|------------------------------------|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502101 | An Introduction to Engineering | 1 | - | | √ | |
| 502103 | Engineering Drawing | 2 | - | | | √ |
| 502104 | Engineering Workshop | 1 | - | | | √ |
| 502221 | Statics | 3 | 502102 | | | √ |
| 502241 | Surveying | 3 | - | √ | | |
| 502371 | Engineering Economy and Management | 3 | 601101 | √ | | |



Ajloun National University

جامعة عجلون الوطنية

Fourth :Faculty Requirements (96) Credit Hours

A. Compulsory and Supportive Department Requirements Credit Hours: (78) Hours

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|--|-------------|-----------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502211 | Engineering geology | 3 | 502108 | | √ | |
| 502222 | Strength of Materials | 3 | 502221 | | √ | |
| 502224 | Dynamics | 3 | 502221 | | √ | |
| 502231 | Building Construction | 3 | 502103 | | | √ |
| 502242 | Surveying lab | 1 | - | | | √ |
| 502309 | Materials Science Engineering and Construction Materials | 3 | 502222 & 502108 | | √ | |
| 502310 | Materials Science Engineering and Construction Materials Lab | 1 | - | | | √ |
| 502313 | Geotechnical Engineering (1) | 3 | 502309 | | √ | |
| 502314 | Geotechnical Engineering Lab | 1 | - | | | √ |
| 502321 | Structural analysis (1) | 3 | 502222 | | | √ |
| 502340 | Highway Geometric Design | 3 | 502241 | | √ | |
| 502342 | Traffic Engineering | 3 | 502203 | | √ | |
| 502351 | Fluid Mechanics | 3 | 502201 | | √ | |
| 502355 | Hydraulics | 3 | 502351 | | √ | |
| 502356 | Fluid Mechanics and Hydraulics Lab | 1 | - | | | √ |
| 502411 | Foundation Engineering (1) | 3 | 502313 | | | √ |
| 502431 | Reinforced concrete (1) | 3 | 502321 | | | √ |
| 502432 | Steel Structure (1) | 3 | 502321 | | | √ |
| 502433 | Reinforced concrete (2) | 3 | 502431 | | | √ |
| 502441 | Pavement materials & Design | 3 | 502309 & 502340 | | √ | |
| 502442 | Highway Engineering lab | 1 | - | | | √ |
| 502443 | Airport and Railway Engineering | 3 | 502441 | | √ | |
| 502453 | Engineering Hydrology | 3 | 502351 | √ | | |
| 502461 | Environmental Engineering | 3 | 502108 | √ | | |
| 502464 | Engineering of Water and Wastewater Treatment (1) | 3 | 502461 | √ | | |
| 502465 | Environmental Engineering Lab. | 1 | - | | | √ |



Ajloun National University

جامعة عجلون الوطنية

| | | | | | | |
|--------|--|---|---|---|---|--|
| 502470 | Contracts, Specifications & Quantity Surveying | 3 | 502241 | √ | | |
| 502472 | Construction Management | 3 | 502371 | | √ | |
| 502582 | Engineering Training | 3 | Successfully completing 115 hours (280 continuous training hours) | | √ | |
| 502591 | Graduation Project (1) | 1 | Successfully complete 120 hours | √ | | |
| 502592 | Graduation Project (2) | 2 | 502591 | | √ | |

B. Elective Department Requirements Credit Hours: (18) Hours

(Group one: General)

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|---|-------------|---------------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502261 | Renewable Energy Application and Sustainability | 3 | - | √ | | |
| 502501 | Simulations in Civil Engineering | 3 | 502201 | | √ | |
| 502502 | Special topics in civil engineering | 3 | Department Approval | √ | | |
| 502503 | Computer Applications in Civil Engineering | 3 | 502433&502432 | | √ | |
| 502504 | Building Services | 3 | 502472 | | √ | |
| 502505 | Geographic Information System GIS | 3 | 5th year level | | √ | |
| 502571 | Construction Methods | 3 | 502472 | | | √ |
| 502572 | Building Engineering Systems | 3 | 502201 | | √ | |



Ajloun National University

جامعة عجلون الوطنية

(Group Two: Structure)

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|--|-------------|-------------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502531 | Steel Structure (2) | 3 | 502432 | | | √ |
| 502532 | Reinforced concrete (3) | 3 | 502433 | | | √ |
| 502533 | Pre-stressed Concrete | 3 | 502433 | | | √ |
| 502534 | Bridge Engineering | 3 | 502433& 502432 | | √ | |
| 502322 | Structural analysis (2) | 3 | 502321 | | | √ |
| 502521 | Matrix Structural Analysis | 3 | 502322 | √ | | |
| 502522 | Advanced structural Analysis | 3 | 502322 | | √ | |
| 502523 | Finite Element for structural analysis | 3 | 502521 | | √ | |
| 502524 | Structural Dynamics | 3 | 502322 | | √ | |

(Group Three: Highway and Transportation)

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|-----------------------------------|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502535 | Highway Materials | 3 | 502441 | √ | | |
| 502536 | Highway Maintenance | 3 | 502441 | | √ | |
| 502540 | Advanced Highway Geometric Design | 3 | 502472 | | | √ |
| 502541 | Aerial Survey | 3 | 502340 | √ | | |
| 502542 | Advanced Surveying | 3 | 502241 | | √ | |
| 502544 | Transportation Engineering | 3 | 502241 | | √ | |
| 502545 | Highway Safety | 3 | 502342 | | √ | |



Ajloun National University

جامعة عجلون الوطنية

(Group Four: Water and Environmental Engineering)

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|---|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502551 | Water Resources Engineering | 3 | 502465 | √ | | |
| 502552 | Hydraulic Structures | 3 | 502313 | | √ | |
| 502555 | Irrigation and Drainage Engineering | 3 | 502355 | | √ | |
| 502561 | Solid Waste Management | 3 | 502465 | √ | | |
| 502562 | Design of water and wastewater networks | 3 | 502465 | | √ | |
| 502563 | Dams Engineering | 3 | 502411 | | | √ |
| 502564 | Water Desalination | 3 | 502461 | | | √ |
| 502565 | Groundwater Hydrology | 3 | 502553 | | | √ |
| 502566 | Environmental Impact Assessment | 3 | 502465 | | √ | |
| 502568 | Engineering of Water and Wastewater Treatment (2) | 3 | 502461 | | √ | |

(Group Five: Geotechnical Engineering)

| Course code | Course Name | Credit Hour | Prerequisite | Learning Type | | |
|-------------|--------------------------------------|-------------|--------------|---------------|---------|-----------|
| | | | | Electronic | Blended | On Campus |
| 502511 | Geotechnical Engineering (2) | 3 | 502313 | | √ | |
| 502512 | Soil Stabilization structures | 3 | 502411 | | | √ |
| 502513 | Foundation Engineering (2) | 3 | 502411 | | | √ |
| 502514 | Soil improvement and slope stability | 3 | 502313 | √ | | |

fifth field: Free Elective Requirements (03) Credit Hours

The students studies a free course offered by the university with (3) credit hours



Ajloun National University

جامعة عجلون الوطنية

Advisement Plan for obtaining a bachelor's degree in Civil Engineering

First Year

First Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|--------------------------------------|--------------|--------------|
| 502102 | General Physics (1) | 3 | - |
| 502104 | Engineering Workshop | 1 | - |
| 502108 | General Chemistry | 3 | - |
| 502109 | General Chemistry Lab | 1 | - |
| 601101 | Calculus (1) | 1 | - |
| 704107 | Entrepreneurship and Innovation | 1 | - |
| 704109 | Leadership and Social Responsibility | 1 | - |
| 704116 | Life Skills | 1 | - |
| 704118 | Arabic Language Skills (1) | 2 | 704099 |
| Total | | 16 | |

Second Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|---|--------------|--------------|
| 311107 | Programming fundamentals for Engineering Students | 3 | - |
| 502101 | An Introduction to Engineering | 2 | - |
| 502103 | Engineering Drawing | 1 | - |
| 502300 | Technical Writing and Engineering Ethics | 2 | - |
| 502106 | General Physics (2) | 3 | - |
| 502107 | General Physics Lab | 1 | - |
| 601102 | Calculus (2) | 3 | 601101 |
| 704117 | English Language Skills (1) | 2 | 714099 |
| Total | | 17 | |



Ajloun National University

جامعة عجلون الوطنية

Second Year

First Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|--|--------------|--------------|
| 704119 | National Education | 2 | - |
| 502 203 | Probability and Statistics for Engineering | 3 | 601102 |
| 502221 | Statics | 3 | 502102 |
| 502231 | Building Construction | 3 | 502103 |
| - | University Elective Course Requirements | 3 | - |
| - | University Elective Course Requirements | 3 | - |
| Total | | 17 | |

Second Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|---|--------------|--------------|
| 502201 | Engineering Mathematics | 3 | 601102 |
| 502211 | Engineering Geology | 3 | 502108 |
| 502222 | Strength of Materials | 3 | 502221 |
| 502224 | Dynamics | 3 | 502221 |
| 502241 | Surveying | 3 | - |
| 502242 | Surveying lab | 1 | - |
| - | University Elective Course Requirements | 3 | - |
| Total | | 19 | |



Ajloun National University

جامعة عجلون الوطنية

Third Year

First Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|--|--------------|-----------------|
| 502309 | Materials Science Engineering and Construction Materials | 3 | 502222 & 502108 |
| 502310 | Materials Science Engineering and Construction Materials Lab | 1 | - |
| 502351 | Fluid Mechanics | 3 | 502221 |
| 502371 | Engineering Economy and Management | 3 | 601101 |
| 502372 | Numerical Analysis Methods | 3 | 601102 |
| - | Department Elective Course Requirements | 3 | - |
| Total | | 16 | |

Second Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|-----------------------------------|--------------|--------------|
| 704200 | Military Science | 3 | - |
| 502313 | Geotechnical Engineering (1) | 3 | 502211 |
| 502314 | Geotechnical Engineering Lab | 1 | - |
| 502321 | Structural Analysis (1) | 3 | 502222 |
| 502342 | Traffic Engineering | 3 | 502203 |
| 502355 | Hydraulics | 3 | 502351 |
| 502356 | Fluid Mechanics and Hydraulic Lab | 1 | - |
| Total | | 17 | |



Ajloun National University

جامعة عجلون الوطنية

Fourth Year

First Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|---|--------------|--------------|
| 502340 | Highway Geometric Design | 3 | 502241 |
| 502411 | Foundation Engineering (1) | 3 | 502313 |
| 502431 | Reinforced Concrete (1) | 3 | 502231 |
| - | Department Elective Course Requirements | 3 | - |
| - | Department Elective Course Requirements | 3 | - |
| Total | | 15 | |

Second Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|---|--------------|---------------------------------------|
| 502432 | Steel Structure (1) | 3 | 502321 |
| 502433 | Reinforced Concrete (2) | 3 | 502431 |
| 502441 | Pavement Materials and Design | 3 | 502309 & 502340 |
| - | Department Elective Course Requirements | 3 | - |
| - | Free Electives | 3 | - |
| 502582 | Engineering Training | 3 | Successfully complete 115 hours |
| Total | | 18 | |



Ajloun National University

جامعة عجلون الوطنية

Fifth Year

First Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|--|--------------|---------------------------------|
| 502442 | Highway Engineering Lab | 1 | - |
| 502461 | Environmental Engineering | 3 | 502108 |
| 502470 | Contracts, specifications & Quantity Surveying | 3 | 502241 |
| 502472 | Construction Management | 3 | 502 371 |
| - | Department Elective Course Requirements | 3 | - |
| 502591 | Graduation Project (1) | 1 | Successfully complete 120 hours |
| Total | | 14 | |

Second Semester

| Course Number | Course Name | Credit Hours | Prerequisite |
|---------------|---|--------------|--------------|
| 502443 | Airport and Railway Engineering | 3 | 502441 |
| 502453 | Engineering Hydrology | 3 | 502351 |
| 502464 | Engineering of Water and Wastewater Treatment (1) | 3 | 502461 |
| 502465 | Environmental Engineering Lab. | 1 | - |
| 502592 | Graduation Project (2) | 2 | 502591 |
| - | Department Elective Course Requirements | 3 | - |
| Total | | 18 | |



Ajloun National University

جامعة عجلون الوطنية

Courses Description

Faculty Compulsory Course Requirements in the field of Mathematics and Science (31 Credit Hours)

Course Number : 502102
Course Title : General Physics (1)
Credit Hours : 3
Prerequisites : -

Physics and measurement; Vector calculus; Motion in one dimension; Motion in two dimensions; Newton laws of motion; Energy and energy transfer; circular motion; potential energy.

Course Number : 502106
Course Title : General Physics (2)
Credit Hours : 3
Prerequisites : 502102

Electric field, Gauss's law, Electric Potential, Capacitance and Dielectric, Current and Resistance, DC- Circuit, Magnetic field.

Course Number : 502107
Course Title : General Physics Lab
Credit Hours : 1
Prerequisites : 502106

Measurement and Error, Projectile Motion, Newton 2nd law, Rotational Motion, Conservation of Energy, Ohm's law, Potentiometer, Galvanometer, RC Circuit, Wheatstone Bridge.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502108
Course Title : General Chemistry
Credit Hours : 3
Prerequisites : -

Scientific measurement, gravimetric calculations, atomic structure, electronic construction of atoms and ions, periodic table, molecules, chemical bonds, reactions in aqueous solutions, mole concept, oxidation and reduction, acids and bases, gases, electrochemistry.

Course Number : 502109
Course Title : General Chemistry Lab
Credit Hours : 1
Prerequisites : -

Physical properties of water, element determination, partial formula and partial weight, calculation of crystalline water, solution titration, chemical reaction speed, chemical cell potential, antacid measurement study.

Course Number : 601101
Course Title : Calculus (1)
Credit Hours : 3
Prerequisites : -

Functions, the general exponential and logarithmic functions, limits and continuity, derivatives, rules of differentiation, tangent and normal lines, the mean value theorem of differentiation and its applications, indeterminate forms ($0/0$, ∞/∞), vertical and horizontal asymptotes, local extrema, concavity, and curve sketching, the definite integral, the fundamental theorem of calculus, the indefinite integral, substitution integrals, applications of the definite integral (area, volumes and solids of revolutions).

Course Number : 601102
Course Title : Calculus (2)
Credit Hours : 3
Prerequisites : 601101

Hyperbolic functions, inverse functions of trigonometric and hyperbolic functions, techniques of integration (integration by parts, trigonometric integrals, trigonometric substitutions, partial fractions, improper integrals), sequences and infinite series convergence and divergence, positive term series, alternating series, absolute and conditional



Ajloun National University

جامعة عجلون الوطنية

convergence, power series(differentiation and integration of power series, Taylor series), plane curves and polar coordinates, area in polar coordinates.

Course Number : 502201
Course Title : **Engineering Mathematics**
Credit Hours : 3
Prerequisites : 601102

Ordinary differential equations, linear differential equations of second and higher order, systems of differential equations, phase plane, stability, series solutions of differential equations, orthogonal functions, Laplace transforms, linear systems of equations, matrices and determinants.

Course Number : 502203
Course Title : **Probability and Statistics for Engineers**
Credit Hours : 3
Prerequisites : 601102

Graphs and numerical measures, the Chebyshev Inequality, Regression equation, the mean, the median, the mode, standard deviation, principles of probability, Random variables, computing variance and expectation, computing simple correlation and Regression, Pearson and spearman coefficients, counting methods of combinations principles of probability, sample distributions, Random variables, principles of hypotheses testing, statistical reasoning about one and two societies.

Course Number : 502372
Course Title : **Numerical Analysis Methods**
Credit Hours : 3
Prerequisites : 601102

Numerical analysis, numerical methods in linear algebra, numerical methods for ordinary and partial differential equations.

Course Number : 502300
Course Title : **Technical Writing and Engineering Ethics**
Credit Hours : 2
Prerequisites : 704117

Report structure, Proposal writing, Structuring Paragraphs and Sentences, graphs and tables, methodology writing, references and appendixes, extended abstracts, presenting data and recommendation writing.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 311107
Course Title : **Programming fundamentals for Engineering Students**
Credit Hours : 3
Prerequisites : -

Computer packages for mathematical and symbolic manipulations (Mat lab, Mathematica), Windows environment, Graphics packages and spread sheets (Excel), Engineering packages for computation in water resources & structures spreadsheets, Applications in Civil Engineering, Data processing and statistical packages.

Faculty Compulsory Course Requirements in the field of Basic engineering Science(13 Credit Hours)

Course Number : 502101
Course Title : **An Introduction to Engineering**
Credit Hours : 1
Prerequisites : -

Engineering History, Engineering Ethics, Regulations and Job Description, Safety, Jordan Engineers Association Regulations, Quality Assurance and Quality Control, Integrity and Anti-Corruption Commission Law, Jordan Work Law.

Course Number : 502103
Course Title : **Engineering Drawing**
Credit Hours : 2
Prerequisites : -

Geometric drawing tools and their uses, letter and number writing, geometric drawing and engineering processes, engineering projections, orthogonal projection, parallel projection, sections, Descriptive geometry, holographic, engineering applications, computer drawing.

Course Number : 502104
Course Title : **Engineering Workshop**
Credit Hours : 1
Prerequisites : -

Metalworking and welding, Metalworking machines, Plumbing, industrial and professional safety.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502221
Course Title : Statics
Credit Hours : 3
Prerequisites : 502102

Force Vectors and resultant, Force systems, equilibrium of particles and rigid bodies, structural analysis for trusses, beams and frames, Center of area and moment of inertia of an area, shearing force and bending moment diagrams for Beams.

Course Number : 502241
Course Title : Surveying
Credit Hours : 3
Prerequisites : -

Linear surveying, Leveling and contouring, angles measurements and bearings, areas and volumes computations, profiles and cross-sections, traverse surveys, Electronic distance measurements (EDM), Principles of triangulation, Theory of errors and adjustments.

Course Number : 502371
Course Title : Engineering Economy and Management
Credit Hours : 3
Prerequisites : 601101

Concepts of time value of money, Simple and compound interest, Interest formulas, Decision making among alternatives and evaluation of public projects, Inflation, depletion and depreciation calculations, cost of owning and operating equipment, Breakeven, Minimum Cost life, replacement analysis.



Ajloun National University

جامعة عجلون الوطنية

Department Compulsory Course Requirements in (78 Credit Hours)

Course Number : 502211
Course Title : Engineering geology
Credit Hours : 3
Prerequisites : 502108

Earth materials, Physical Geology, weathering of rocks, Landslides and Earthquakes, Rock formation processes, Types and properties of rocks, Physical properties of minerals, Engineering Classification of Rock, Structural Geology, Engineering considerations, Ground Water, Soil Formation, Clay Minerals, Subsurface Exploration.

Course Number : 502222
Course Title : Strength of Materials
Credit Hours : 3
Prerequisites : 502221

Mechanical behavior of materials, Hook's law, Normal and shear stresses and strains, bending moment, analysis and design of structural and machine elements subjected to axial, torsional, and flexural loadings, combined stresses and stress transformation, composite sections, Deflection of beams, Buckling of columns, Moment area method, Mohr's Circle for plane stress.

Course Number : 502224
Course Title : Dynamics
Credit Hours : 3
Prerequisites : 502221

Kinematics of particles, Kinematics of rigid bodies, Work-energy equation, Principle of impulse and momentum, Newton's second law, Conservation of energy impulse-momentum, Application to a system of particles.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502231
Course Title : **Building Construction**
Credit Hours : 3
Prerequisites : 502103

Building philosophy, Types of buildings and civil engineering systems, Structural elements and load distribution on slabs, beams, columns and footings, Types of foundation, Geometric design of stairs and Elevators walls Form work, Flooring, and damp proofing, Provision of joints in structures, Timber and steel structures, design and construction details.

Course Number : 502242
Course Title : **Surveying lab**
Credit Hours : 1
Prerequisites : -

Chain surveying, offset, levelling staff, setting out levels, profile and cross-section leveling. Contouring, Traverse surveying and theodolite. Tachometry and electronic distance measurements Measurement of areas with plan meter.

Course Number : 502309
Course Title : **Materials Science Engineering and Construction Materials**
Credit Hours : 3
Prerequisites : 502108&502222

The structure of materials, power full atomic and energy relationship, properties of the nucleus, Electron shells, and radioactivity, general, classification of Construction materials, atomic of bonds, solid state, structure, metallic crystalline structure, properties and crystal defects, polymers structure, Elastic/plastic deformation, cracks, creep, fatigue. Bonding materials(cements), and aggregates, quality of water, Admixtures, fresh concrete properties. Concrete operations, mixing, handling, compacting curing of concrete, and bricks work.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502310
Course Title : **Materials Science Engineering and Construction
Materials Lab**
Credit Hours : 1
Prerequisites : -

Specific Gravity, Normal Consistency and Setting Time of Cement, Fresh and Mechanical Properties of Mortar, Sieve Analysis, Specific Gravity, Unit Weight, and Abrasion tests of Aggregates, slump test and Hardened properties of concrete, Nondestructive testing (Schmidt hammer and ultrasonic pulse velocity), Mechanical properties of ductile and brittle steel, Tests on wood (Mechanical and Visual), Hardness Test on Metals.

Course Number : 502313
Course Title : **Geotechnical Engineering (1)**
Credit Hours : 3
Prerequisites : 502309

Soil Properties, Soil investigation, Phase relations and index properties, soil classification, soil compaction, principle of effective stress, stresses due to self-weight, stresses due to applied loads, soil permeability, seepage: one and two dimensional flow net, consolidation theory and settlement analysis: secondary compression, shear strength of soils, Slope stability, Soil Improvement, Surface and subsurface reconnaissance.

Course Number : 502314
Course Title : **Geotechnical Engineering Lab**
Credit Hours : 1
Prerequisites : -

Specific gravity test, Dry screening using sieve analysis, Hydrometer test, water content, Atterberg Limits: Liquid limit, Plastic limit, Shrinkage limit, Standard and Modified Proctor compaction tests, in-situ field test, Permeability test, Triaxial shear test, unconfined compression test, direct shear test.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502321
Course Title : **Structural analysis (1)**
Credit Hours : 3
Prerequisites : 502222

Classification of structures, analysis of statically determinate structures, principle of superposition, equilibrium equations, compound trusses, internally loading developed in structural members (normal force, shear and moment of beam), cables and arches, influence lines for statically determinate structures, deflection by double integration, moment area and conjugate beam, Castigliano's methods, principle of virtual work.

Course Number : 502340
Course Title : **Highway Geometric Design**
Credit Hours : 3
Prerequisites : 502241

Principles of route location. Horizontal alignment, design and setting out (circular curve element), setting out of circular and transition curves, super elevation. Sight distance, stopping and passing sight distance, Vertical alignment, design and setting out (properties of vertical curves). Coordination of horizontal and vertical curves, Capacity of two-lane highways, Geometric design of intersection.

Course Number : 502342
Course Title : **Traffic Engineering**
Credit Hours : 3
Prerequisites : 502203

Characteristics and classification of transportation systems, public transportation, traffic flow theory, vehicular speed analysis and characteristics, traffic volume and delay studies, capacity analysis of signalized and un signalized intersections, Parking facilities, traffic signs and markings, highway capacity and design of lanes, design of traffic signals.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502351
Course Title : Fluid Mechanics
Credit Hours : 3
Prerequisites : 502201

Fluid properties, Fluid statics. Forces on plane and curved submerged surfaces, buoyancy & floatation, flowing fluids, Differential and integral continuity equation, Pressure variation in flowing fluids, Euler's and Bernoulli's equations, Applications of Bernoulli equation, Momentum principle and its applications, Navier-Stokes equations, Energy equation, Hydraulic and energy, Flow in conduits, laminar and turbulent flows, frictional and minor losses, piping systems.

Course Number : 502355
Course Title : Hydraulics
Credit Hours : 3
Prerequisites : 502351

Energy equation, friction losses, minor losses, types of pipe flow & Reynolds number, series piping, parallel piping, hydraulic machinery, Hydraulic Pump, Water Hammer, open channel flow.

Course Number : 502356
Course Title : Fluid Mechanics and Hydraulics Lab
Credit Hours : 1
Prerequisites : -

properties of fluids, Center of pressure, triangular and rectangular notches, impact of a jet, head loss in pipes, turbulent pipe flow, centrifugal pumps, axial flow pumps, hydraulic jump, Pelton wheel, flow in open channels.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502411
Course Title : **Foundation Engineering (1)**
Credit Hours : 3
Prerequisites : 502313

Boring and sampling, in-site tests, classification of foundations, bearing capacity and settlement of foundations, shallow foundations design, deep foundations, Pile foundations analysis and design, Earth pressure and retaining walls, Foundations on expansive soils, Mat (Raft) foundation. Foundation engineering is the application and practice of the fundamental principles of soil mechanics and rock mechanics (i.e., geotechnical engineering) in the design of foundations of various structures. These foundations include those of columns and walls of buildings, bridge abutments, embankments, and others. It also involves the analysis and design of earth-retaining structures such as retaining walls, sheet-pile walls, and braced.

Course Number : 502431
Course Title : **Reinforced Concrete (1)**
Credit Hours : 3
Prerequisites : 502321

Materials related to reinforces concrete, flexural analysis and design of beams, Shear and diagonal tension in beams, Bond, anchorage and development length in steel, One-way solid and ribbed slabs design. Introduction to axially loaded in short columns.

Course Number : 502432
Course Title : **Steel Structure (1)**
Credit Hours : 3
Prerequisites : 502321

Specifications Loads and methods of design, Analysis and design of tension members, compression members, Design beams for flexure, shear and deflection, Plastic hinges, collapse mechanism, Analysis and design of Beam-columns, Bolted and Welded connections, Design of plates.



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جامعة عجلون الوطنية

Course Number : 502433
Course Title : Reinforced concrete (2)
Credit Hours : 3
Prerequisites : 502431

Analysis and design for torsion, design of eccentrically loaded short columns and slender columns, analysis and design of two-way slab, footing and foundation, retaining walls, Load moment interaction diagram, columns subjected to biaxial bending, design of staircases.

Course Number : 502441
Course Title : Pavement materials & Design
Credit Hours : 3
Prerequisites : 502309 & 502340

Types of pavements and their definitions, soil classification for road use, types of bituminous materials and tests performed, asphalt use for roads, design of asphalt mixtures using Marshall method, the analysis of stresses in rigid and flexible pavements, pavement layers, determination of equivalent single axle loads, design of flexible and rigid pavements using AASHTO method.

Course Number : 502442
Course Title : Highway Engineering lab
Credit Hours : 3
Prerequisites : 502441

Bitumen tests: penetration test, ring and ball test (softening test), viscosity test, flash and fire point test, and ductility test, Aggregate tests: Los Anglos test, absorption test, aggregate impact test, aggregate gradation, specific gravity, pavement evaluation tests, California Bearing Ratio(CBR), Benkelman Beam: road skid resistance, Mix design test: Marshall test, Hveen test and super-pave test.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502443
Course Title : **Airport and Railway Engineering**
Credit Hours : 3
Prerequisites : 502351

Hydrologic cycle and its components, precipitation, evaporation, transpiration, infiltration, stream flow, Rainfall-runoff analysis and its application, peak flow calculations, flood routing, Design floods, hydrologic forecast and design criteria. Groundwater hydrology and well hydraulics. Computer applications.

Course Number : 502453
Course Title : **Engineering Hydrology**
Credit Hours : 3
Prerequisites : 502351

Hydrologic cycle and its components, precipitation, evaporation, transpiration, infiltration, stream flow, Rainfall-runoff analysis and its application, peak flow calculations, flood routing, Design floods, hydrologic forecast and design criteria. Groundwater hydrology and well hydraulics. Computer applications.

Course Number : 502461
Course Title : **Environmental Engineering**
Credit Hours : 3
Prerequisites : 502108

Introduction to environmental and ecological systems, Environmental chemistry and microbiology, Water quality parameters and standards, Population estimation, Material balance and reactor Engineering, Water treatment units and design, Air pollution, Noise pollution, Environmental Impact Assessment.

Course Number : 502464
Course Title : **Engineering of Water and Wastewater Treatment (1)**
Credit Hours : 3
Prerequisites : 502461

Water and wastewater quality, Water supply systems, Sewer system, Reactors and reactor engineering, Chemical and biological Kinetics, Wastewater generation and collection, Sedimentation, filtration, coagulation-flocculation and disinfection, Wastewater estimations, Water supply systems design.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502465
Course Title : Environmental Engineering Lab
Credit Hours : 1
Prerequisites : -

Physical and chemical properties of water, spectrophotometry and Beers' law, pH, turbidity, alkalinity, acidity, hardness, acid-base titration, biological and chemical oxygen demands, bacterial counts in water, Chlorine, Electrical Conductivity.

Course Number : 502470
Course Title : Contracts, Specifications & Quantity Surveying
Credit Hours : 3
Prerequisites : 502241

Types and documents of tenders, types of construction contracts, bonds and insurance requirements, Jordan and International general conditions and obligations of construction contracts, preparation of specifications, regulations pertinent to buildings, construction works and building materials, quantity surveying and bill of quantities, rights and obligations of engineering consulting offices.

Course Number : 502472
Course Title : Construction Management
Credit Hours : 3
Prerequisites : 502371

Planning and construction management concepts, Network-analysis using arrow techniques, Network analysis using precedence technique, overlapping networks, project monitoring, project control, time-cost trade off, resource levelling, Program Evaluation and Review Technique "PERT", Scheduling Techniques.

Course Number : 502582
Course Title : Engineering Training
Credit Hours : 3
Prerequisites : Complete 115 credits successfully

Practical training in a Civil Engineering Project or any other places approved by the department, and according to the regulations drafted by the faculty of engineering training committee.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502591
Course Title : Graduation Project (1)
Credit Hours : 1
Prerequisites : Complete 120 credits successfully

A group of students working as a team, under the supervision of faculty members, are required to formulate a major civil engineering project. The team is required to prepare proposals, manage data acquisition, carry out feasibility studies and evaluate alternatives in preparation for Graduation Project (2). Teams are also required to submit and present technical progress reports.

Course Number : 502592
Course Title : Graduation Project (2)
Credit Hours : 2
Prerequisites : 502591

In continuation of Graduation Project (1), each team work towards completing analysis and design of their project. The student is also required to submit a technical report provided with all necessary documents and drawings. The evaluation procedure includes an oral presentation made by the student in front of three members examining committee nominated by the Department Council and presided over by the Faculty Supervisor.



Ajloun National University

جامعة عجلون الوطنية

Department Elective Course Requirements (18 Credit Hours)

| | |
|---------------|--|
| Course Number | : 502261 |
| Course Title | : Renewable Energy Application and Sustainability |
| Credit Hours | : 3 |
| Prerequisites | : - |

Emerging renewable energy technologies and integrating sustainable building design practices.

| | |
|---------------|---|
| Course Number | : 502501 |
| Course Title | : Simulations in Civil Engineering |
| Credit Hours | : 3 |
| Prerequisites | : 502201 |

Engineering design principles, interactive design using workstations and software tools, Programming languages, data structures and their design, Computer graphics, introduction to GKS, Star base Libraries. Computer aided drafting, data base management system, simulation and optimization, Applications in Civil Engineering, structural design.

| | |
|---------------|--|
| Course Number | : 502502 |
| Course Title | : Special topics in civil engineering |
| Credit Hours | : 3 |
| Prerequisites | : Department approval |

Selected topics in Civil Engineering such that does not exist in the study plan (e.g. inspection and maintenance of bridges)

| | |
|---------------|---|
| Course Number | : 502503 |
| Course Title | : Computer Applications in Civil Engineering |
| Credit Hours | : 3 |
| Prerequisites | : 502432&502433 |

Computer packages for mathematical and symbolic manipulations (Mat lab, Mathematica), Windows environment. Graphics packages and spread sheets (Excel). Engineering packages for computation in water resources & structures spreadsheets. Application in Civil Engineering. Data processing and statistical packages.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502504
Course Title : **Building Services**
Credit Hours : 3
Prerequisites : 502472

Comfort, safety and wellbeing of building occupants, Air conditioning and mechanical ventilation, electrical light and power, fire services, fire safety engineering, water and waste services, data and communications, security and access control, vertical transportation and acoustics.

Course Number : 502505
Course Title : **Geographic Information System GIS**
Credit Hours : 3
Prerequisites : Fifth year level

Fundamental of GIS, explore the data and data entry in GIS data structure for GIS, data acquisition, data processing, database management, analysis and manipulation, Emphasis on product generation, Application of GIS in civil engineering.

Course Number : 502571
Course Title : **Construction Methods**
Credit Hours : 3
Prerequisites : 502472

Understanding and selection of heavy construction equipment, earth moving, tunneling, compaction, construction equipment productivity, factors affecting equipment productivity, economic analysis of plant ownership.

Course Number : 502572
Course Title : **Building Engineering Systems**
Credit Hours : 3
Prerequisites : 502201

Introduction to systematic solution of building engineering problems. Techniques treated include linear programming, network analysis, nonlinear programming, Decision analysis and simulation. Application of optimization methods for solution of design problems in building science, building environment, building structures, and construction management.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502322
Course Title : Structural analysis (2)
Credit Hours : 3
Prerequisites : 502321

Indeterminate structures, force method, slope deflection method, and moment distribution method, influence line for first-degree indeterminate beams, stiffness method for trusses, beams, and frames.

Course Number : 502521
Course Title : Matrix Structural Analysis
Credit Hours : 3
Prerequisites : 502322

Matrix algebra, Methods of solving simultaneous linear equations, Elasticity theory, Introduction to stiffness method, Development of Truss equations, derivation of stiffness for bar element, transformation, computation of stresses..., Space truss, Bandwidth, banded symmetric matrices, Development of beam element, Stiffness, potential energy approach for derivation of beam equations, Plane framed equations, Grid equations, Computer application.

Course Number : 502522
Course Title : Advanced structural Analysis
Credit Hours : 3
Prerequisites : 502322

Introduction to matrix methods of analysis, static indeterminacy and kinematic indeterminacy, degree of freedom, coordinate system, structure idealization stiffness and flexibility matrices – suitability element stiffness equations, elements flexibility equations – mixed force, displacement equations for truss element, beam element and tensional element, Transformation of coordinates, element stiffness matrix and load vector, local and global coordinates. This course introduces students to higher-level Theory of Structures. Emphasis is placed upon students gaining a real understanding of elementary plastic theory of structures with application for slab analysis and design, dynamics of structures, stability of structural elements and structural systems. The topics are linked to requirements of Australian Standards. The course also revises the most common software used in the workforce for Advanced Structural Analysis.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502523
Course Title : **Finite Element for structural analysis**
Credit Hours : 3
Prerequisites : 502521

Theoretical basis of the finite element method, Elements for use in the solution of two-and three-dimensional problems, Plate-bending problems and shell problems, Computer Applications.

Course Number : 502524
Course Title : **Structural Dynamics**
Credit Hours : 3
Prerequisites : 502322

The response of SDOF systems with and without damping to free vibration, harmonic, and arbitrary excitations, Compute the dynamic response of structural components (like beams, walls, and columns) and structural systems under dynamic loads such as blast and earthquake excitations, Lumped and distributed mass systems including modal analysis of MDOF systems will be covered.

Course Number : 502531
Course Title : **Steel Structure (2)**
Credit Hours : 3
Prerequisites : 502432

Bolted and welded connections, Building Connections, Rigid Steel frames, elastic and plastic design methods, supports of rigid frames, composite design.

Course Number : 502532
Course Title : **Reinforced concrete (3)**
Credit Hours : 3
Prerequisites : 502433

Review of flexural, shear, and torsional behavior of reinforced concrete beams of different cross-sections, Deflection and curvature, limit analysis and design of beams and frames, Moment redistribution, Yield-line theory of slabs, Deflection of two-way edge supported and flat slabs, Behaviour and design of brackets, corbels, bearing walls, shear walls and beam-column joints.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502533
Course Title : Pre-stressed Concrete
Credit Hours : 3
Prerequisites : 502433

Short- and long-term properties of constituent materials, partial prestressing, Flexural behaviour, analysis and design of prestressed concrete beams, classes, cracking, pre-tensioning, post-tensioning, service load design, load balancing, strength design, strain limits, flexural efficiency, Bond, transfer and development lengths, anchorage zone design, Shear and diagonal tension, Evaluation of immediate and long-term losses, Composite construction and design, shear-friction theory, Deflection calculation using approximate single time step approach.

Course Number : 502534
Course Title : Bridge Engineering
Credit Hours : 3
Prerequisites : 502432&502433

Classification of bridges, Structural components, Superstructures and Substructures, Bridge loading, Primary loads, Secondary loads, Distribution of live loads, Analysis and design of bridges according to AASHTO specifications, Prestressed and non-prestressed bridges, Steel bridges, Bearing Pads.

Course Number : 502535
Course Title : Highway Materials
Credit Hours : 3
Prerequisites : 502441

Origin and use of asphalt materials, asphalt cement, cutback asphalts, emulsified asphalt, road tars, Aggregates for bituminous mixtures, Design of bituminous mixtures, Mix-design methods, Use of additives in bituminous mixtures.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502536
Course Title : Highway Maintenance
Credit Hours : 3
Prerequisites : 502472

Importance and principles of pavement maintenance management system, subjective and objective pavement evaluation procedures, types and causes of pavement distresses, methods of maintenance and repair (M&R), determination of M&R needs and priorities, field visits, computer applications.

Course Number : 502540
Course Title : Advanced Highway Geometric Design
Credit Hours : 3
Prerequisites : 502340

Highway systems and evaluation, and design criteria, Traffic characteristics, geometric alignment, roadside design, Traffic control and road capacity, highway design elements, road transverse cross-section, Design of rural and urban roads, intersection and interchanges design, contracts and supervision, Design of turning roadways.

Course Number : 502541
Course Title : Aerial Survey
Credit Hours : 3
Prerequisites : 502241

Aerial cameras systems, photo scale, scale distortion, types of photos, stereoscopic vision, planning aerial photography missions, ground control points, image displacements, stereo plotters, photo mosaics, application of aerial surveys to highway design and maintenance.

Course Number : 502542
Course Title : Advanced Surveying
Credit Hours : 3
Prerequisites : 502241

Coordinate's geometry, Applications of Total Station, GIS applications



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502544
Course Title : **Transportation Engineering**
Credit Hours : 3
Prerequisites : 502342

The field of transportation engineering, role of transportation in society economics, social, political, and environmental, Operation and vehicular characteristics for all modes of transportation, Traffic control devices, pavement markings, object marking, delineators, studs, signs, channelization, Traffic signal timings, Rail transportation, Urban rail transit, railway cross section, Air transport demand, selection of airport site and runway orientation, airport passenger terminal area, Water transportation, Classes of harbors and planning and design of port facilities.

Course Number : 502545
Course Title : **Highway Safety**
Credit Hours : 3
Prerequisites : 502342

Road safety problem, Road accidents, Traffic management, Accident reporting and recordings, Accident surveys and analysis, Accident causes and prevention, Traffic regulations.

Course Number : 502551
Course Title : **Water Resources Engineering**
Credit Hours : 3
Prerequisites : 502465

Water laws, Reservoirs, dams, and reservoir basins, Hydro- power generation, Flood estimation, routing and control, Engineering economy in water resources planning, Introduction to system engineering in water resources, Topics in arid and semi-arid region water resources, Desertification water conservation techniques, reuse of water, remote sensing and arid water resources, Linear programming and its applications in water resources.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502552
Course Title : **Hydraulic Structures**
Credit Hours : 3
Prerequisites : 502313

Types of structures, Design of weirs and diversion weir, Farm irrigation structures, ditches, checks, turnouts, drops and chutes, lift force, permeability, seepage, failed of dams, sea structures. Hydraulic structures can be defined broadly as structures designed to handle water in any way – retention, conveyance, control, regulation, mixing and energy dissipation. Such structures are required in all facets of water engineering, the principal facets being water quantity management (flood control, water supply, hydropower, irrigation and drainage, navigation, environmental and recreation use), water-quality management, thermal-power generation, and aspects of road and rail transportation. To ensure that a hydraulic structure functions as required entails the design application of equations based on continuity, momentum and energy principles coupled with useful notions about the mechanical behaviour of construction materials, notably concrete, various metals and soils.

Course Number : 502555
Course Title : **Irrigation and Drainage Engineering**
Credit Hours : 3
Prerequisites : 502355

Introduction to irrigation, Basic soil-water relationships, Soil moisture measurements, Water movement through soil, Salinity in irrigation water and soil, Consumptive use, Surface, sprinkler and trickle irrigation systems, Drainage and pumping, types and methods, Soil erosion and sedimentation.

Course Number : 502561
Course Title : **Solid Waste Management**
Credit Hours : 3
Prerequisites : 502465

Impact of solid and hazardous wastes onto the public health and environment and the importance of treating such wastes as well as their utilization.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502562
Course Title : Design of water and wastewater networks
Credit Hours : 3
Prerequisites : 502465

Design of municipals water and wastewater treatment plants, Characterization of water and wastewater, physical, chemical and biological treatment methods, Sewer System design, processing of sludge, water reuse, Advanced treatment methods.

Course Number : 502563
Course Title : Dams Engineering
Credit Hours : 3
Prerequisites : 502411

Types of dams, choice dam location, Forces acting on dams, design and construction of different types of dams: gravity dams, arch dams, buttress dams, hollow dams, coffer dams, weirs, spillways dam tunnels and gates, quality of water retained by dams, environmental impact of dams.

Course Number : 502564
Course Title : Water Desalination
Credit Hours : 3
Prerequisites : 502461

Seawater/brackish water desalination technologies, Thermal-based (Multi-stage flash's", Multi-effect Distillation "MED", Vapor-compression "VC") Desalination, Desalination and membrane-based (Reverse Osmosis "RO", Nano-filtration "NF", Electro dialysis "ED" and Electro Dialysis Reversal "DR") desalination, Process design and system performance, fouling, scaling (including bio-fouling) and cleaning, product water quality and post-treatment.

Course Number : 502565
Course Title : Groundwater Hydrology
Credit Hours : 3
Prerequisites : 502553

Hydrologic cycle, evaporation, transpiration, precipitation, runoff, hydrographs, aquifers, Darcy's law, well hydraulics, watershed characteristics, channel routing, Hydraulic frequency analysis.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502566
Course Title : Environmental Impact Assessment
Credit Hours : 3
Prerequisites : 502465

This course aims at providing an overview of EIA using RS and GIS with organizational and technical components. Students will explore the theoretical and practical concepts of EIA. It includes an introduction to Geographical Information Systems and Remote Sensing to harmonize the terminology and concepts related to spatial data, its analysis, modelling and EIA.

Course Number : 502568
Course Title : Engineering of Water and Wastewater Treatment (2)
Credit Hours : 3
Prerequisites : 502464

Water quality control in rivers, water and wastewater treatments: physical, chemical, and biological processes, design principles for water and wastewater treatment facilities, Coagulation and flocculation, sedimentation and flotation, filtration and clarification, reactor principles and wastewater treatments including biochemical treatments, secondary sedimentation operation, activated sludge treatment process, bio-film treatment process.

Course Number : 502511
Course Title : Geotechnical Engineering (2)
Credit Hours : 3
Prerequisites : 502313

Soils as engineering materials, common soil classification schemes, the importance of water in the soil and the effects of water movement, Predicting soil settlements, the stress-strain-strength response of soils and earth pressures.



Ajloun National University

جامعة عجلون الوطنية

Course Number : 502512
Course Title : Soil Stabilization structures
Credit Hours : 3
Prerequisites : 502411

Clay mineralogy, mechanical stabilization, stabilization with additives (lime, cement, asphalt, etc.), collapsible soils and their stabilization, swelling-shrinking soils, foundation heave prediction and method of soil treatments, preloading and methods of stabilizing highly compressible soils, vertical sand drains, reinforced earth and reinforced earth retaining walls, thermal stabilization, electro kinetic processes and their use in soil remediation and improvement.

Course Number : 502513
Course Title : Foundation Engineering (2)
Credit Hours : 3
Prerequisites : 502411

Bearing capacity and settlement of shallow foundations (theory and field tests), deep foundations, types of pile foundation, load carrying capacity, static methods and dynamic formulas, pile group, settlement analysis of piles, sheet pile walls and braced cuts.

Course Number : 502514
Course Title : Soil improvement and slope stability
Credit Hours : 3
Prerequisites : 502313

Saturated and unsaturated soil mechanics to the analysis and design of slope stability, Slope failure mechanisms, transient seepage analysis, measurement and selection of shear strength parameters, historical and recent methods of slope stability analysis, designs of slope stabilization measures and instrumentation.