



College of Engineering  
Department of Civil Engineering

B.S. Study Plan

Major: Civil Engineering

Academic Year: 2021 /2022

Study Plan Credit hours ( 162 )

Type of Program: **Blended/ Online**

Major Type:

Humanities

Scientific/Technical

Science Medical

| Teaching Type                                 | Percentage of study plan hours/number | Actual Ratio |
|---|---------------------------------------|--------------|
| Complete Online E-Learning                    | 10% - 20% Maximum                     | 17           |
| Blended learning (for scientific majors)      | 30% - 50% Maximum                     | 45           |
| Face-to-face learning (for scientific majors) | 30% Minimum                           | 38           |

Note: The learning types of the courses are disseminated at all academic levels in the program



### Department Vision

Entrepreneurship and distinction in Civil Engineering, teaching, research, and Engineering applications, both locally and regionally.

### Department Mission

Generate and graduate staff of engineers who are able to compete in the job market with high professionalism, supported by the skills, knowledge and ethics of the profession, and employing them in achieving comprehensive and sustainable development.

### Program Mission

To provide distinguished academic programs in the field of civil engineering supported by the knowledge, skills and ethics of the profession through qualified staff capable of keeping up with local and international standards in accordance with the E-learning integration standards.

### Program Educational Objectives

The program aims to produce graduates who:

1. Contribute effectively to societies, through the gained technical, analytical, and managerial skills, and be up to date with the latest technologies and innovations in Civil engineering areas, including the development of sustainability factors.
2. Be motivated and self-confident toward life-long learning, practicing, and developing their knowledge through a professional career path, pursuing higher education and scientific research in advanced areas of Civil Engineering to produce solutions for complex engineering problems.
3. Practice professional competence ethically, and apply leadership principles through commitment, teamwork, and skills of communication to empower advancements in their career.

### Student Outcomes

The Civil Engineering Program is outlined so that its students will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.





4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.



## Plan Contents

The study plan for a bachelor's degree consists of a major in Civil Engineering of (162) credit hours disseminated as follows:

| Sequence | Classification          | Credit Hours | Percent % |
|----------|-------------------------|--------------|-----------|
| 1st      | University Requirements | 27           | 16.67     |
| 2nd      | College Requirements    | 26           | 16.05     |
| 3rd      | Program Requirements    | 109          | 67.28     |
| Total    |                         | 162          | 100%      |

## Coding System Approved by the University

|              |                   |                  |              |          |
|--------------|-------------------|------------------|--------------|----------|
| 6            | 0 2               | x                | x            | x        |
| Faculty Code | Program Code      | Knowledge Domain | Course Level | Sequence |
| Engineering  | Civil Engineering |                  |              |          |

## Knowledge Areas

| Domain Code | Cognitive Domain  | Credit Hours |
|-------------|---|--------------|
| 1           | Mathematics and Sciences  | 30           |
| 2           | Basic Engineering Sciences                                      | 10           |
| 3           | Basics of Civil Engineering                                     | 12           |
| 4           | Engineering Mechanics   | 12           |
| 5           | Structures  | 16           |
| 6           | Water and Environment   | 11           |
| 7           | Transportation  | 7            |
| 8           | Geotechnical  | 7            |
| 9           | Project Management  | 15           |
| 1-9         | Program Elective Course ( <i>Includes all Knowledge Areas</i> ) | 15           |



**First: University Requirements: (27) Credit Hours**

**A. Compulsory Requirements: (18) Credit Hours**

| Teaching type     |         |              | Course Number | Course Title                                | Credited Hours | Pre-Requirement |
|-------------------|---------|--------------|---------------|---|----------------|-----------------|
| Online E-Learning | Blended | Face-to-Face |               |   |                |                 |
| ✓                 |         |              | 50511104      | Communication Skills -Arabic Language (1)   | 3              | 50511108        |
| ✓                 |         |              | 50511105      | Communication Skills - English Language (1) | 3              | 50511109        |
| ✓                 |         |              | 50511108      | Remedial Course in Arabic                   | 0              |                 |
| ✓                 |         |              | 50511109      | Remedial Course in English                  | 0              |                 |
| ✓                 |         |              | 50511110      | Remedial Course in Computer Science         | 0              |                 |
| ✓                 |         |              | 50511205      | Life Skills and Social Responsibility       | 3              | -               |
| ✓                 |         |              | 50511206      | National Education                          | 3              | -               |
| ✓                 |         |              | 50511305      | Innovation and Entrepreneurship             | 3              | -               |
| ✓                 |         |              | 50511308      | Military Sciences                           | 3              | -               |
|                   |         |              | <b>Total</b>  |   | <b>18</b>      |                 |

**B. Elective Requirements: (9) Credit Hours from the following list:**

| Teaching type     |         |              | Course Number | Course Title                               | Credited Hours | Pre-Requirement |
|-------------------|---------|--------------|---------------|--|----------------|-----------------|
| Online E-Learning | Blended | Face-to-Face |               |  |                |                 |
| ✓                 |         |              | 50521106      | Communication Skills -Arabic Language (2)  | 3              | 50511104        |
| ✓                 |         |              | 50521107      | Communication Skills -English Language (2) | 3              | 50511105        |
| ✓                 |         |              | 50521203      | Principles of Psychology                   | 3              | -               |
| ✓                 |         |              | 50521204      | Human Rights                               | 3              | -               |
| ✓                 |         |              | 50531101      | Islamic Culture                            | 3              | -               |
| ✓                 |         |              | 50531205      | Quds and Hashemite                         | 3              |                 |



|              |  |  |          |                             |          |         |
|--------------|--|--|----------|-----------------------------|----------|---------|
|              |  |  |          | Custodianship               |          |         |
| ✓            |  |  | 50541103 | Computer Skills             | 3        | 5051110 |
| ✓            |  |  | 50541204 | Environment and Development | 3        | -       |
| ✓            |  |  | 50541206 | Health and Community        | 3        | -       |
| ✓            |  |  | 50541308 | Foreign language            | 3        | -       |
| ✓            |  |  | 50541309 | Digital Culture             | 3        | 5051110 |
| <b>Total</b> |  |  |          |                             | <b>9</b> |         |

## Second: College Requirements: (26) Credit Hours

### A. Compulsory Requirements: (26) Credit Hours

| Teaching type     |         |              | Course No. | Course Title                                 | Cr. hr.   | Theoretical | Practical | Prerequisite |
|-------------------|---------|--------------|------------|--|-----------|-------------|-----------|--------------|
| Online E-Learning | Blended | Face-to-Face |            |  |           |             |           |              |
|                   | ✓       |              | 50221101   | Calculus (1)                                 | 3         | 3           | -         | -            |
|                   | ✓       |              | 50221202   | Calculus (2)                                 | 3         | 3           | -         | 50221101     |
|                   | ✓       |              | 50551101   | General Physics (1)                          | 3         | 3           | -         | -            |
|                   |         | ✓            | 50551102   | General Physics Lab (1)                      | 1         | -           | 2         | 50551101*    |
|                   |         | ✓            | 60221101   | Engineering Drawings                         | 2         | -           | 4         | -            |
|                   | ✓       |              | 60222102   | Introduction to Engineering                  | 1         | 1           | -         | -            |
|                   | ✓       |              | 60224203   | Engineering Economics                        | 3         | 3           | -         | 50221101     |
|                   |         | ✓            | 60331204   | Engineering Workshops                        | 1         | -           | 2         | -            |
|                   |         | ✓            | 60363203   | Programming for Engineers                    | 3         | 3           | -         | 5051110      |
|                   | ✓       |              | 60372201   | Communication Skills and Professional Ethics | 3         | 3           | -         | 50511105     |
|                   | ✓       |              | 60375102   | Project Management                           | 3         | 3           | -         | 60224203     |
| <b>Total</b>      |         |              |            |  | <b>26</b> | <b>22</b>   | <b>8</b>  |              |

\* Or Co-requisite



### Third: Program Requirements (109) Credit Hours

#### A. Compulsory Requirements: (74) Credit Hours

| Teaching type     |         |              | Course No. | Course Title                        | Cr. hr. | Theoretical | Practical | Prerequisite          |
|-------------------|---------|--------------|------------|-------------------------------------|---------|-------------|-----------|-----------------------|
| Online E-Learning | Blended | Face-to-Face |            |                                     |         |             |           |                       |
|                   | ✓       |              | 60232101   | Surveying                           | 3       | 3           | -         | 50221101              |
|                   |         | ✓            | 60232102   | Surveying Lab.                      | 1       | -           | 2         | 60232101*             |
|                   | ✓       |              | 60232103   | Engineering Geology                 | 3       | 3           | -         | -                     |
|                   | ✓       |              | 60232204   | Materials Science                   | 3       | 3           | -         | 50551103              |
|                   |         | ✓            | 60234105   | Civil Engineering Drawings          | 2       | -           | 4         | 60221101              |
|                   |         | ✓            | 60241201   | Statics                             | 3       | 3           | -         | 50551101              |
|                   |         | ✓            | 60242102   | Strength of Materials               | 3       | 3           | -         | 60241201              |
|                   | ✓       |              | 60242203   | Dynamics                            | 3       | 3           | -         | 60241201              |
|                   |         | ✓            | 60243104   | Fluid Mechanics                     | 3       | 3           | -         | 60242203              |
|                   |         | ✓            | 60264103   | Fluid Lab.                          | 1       | -           | 2         | 60243104*             |
|                   | ✓       |              | 60252101   | Concrete Technology                 | 3       | 3           | -         | 50551103              |
|                   |         | ✓            | 60252102   | Concrete Technology Lab.            | 1       | -           | 2         | 60252101*             |
|                   |         | ✓            | 60252203   | Structural Analysis (1)             | 3       | 3           | -         | 60242102              |
|                   |         | ✓            | 60253104   | Structural Analysis (2)             | 3       | 3           | -         | 60252203              |
|                   |         | ✓            | 60253205   | Reinforced Concrete Design (1)      | 3       | 3           | -         | 60253104*             |
|                   |         | ✓            | 60254106   | Steel Structures                    | 3       | 3           | -         | 60252203              |
|                   |         | ✓            | 60264102   | Hydraulics                          | 3       | 3           | -         | 60243104              |
|                   |         | ✓            | 60263201   | Hydrology                           | 3       | 3           | -         | 60243104              |
|                   | ✓       |              | 60264204   | Water and Environmental Engineering | 3       | 3           | -         | 50551103              |
|                   |         | ✓            | 60264205   | Environmental Engineering Lab.      | 1       | -           | 2         | 60264204*             |
|                   |         | ✓            | 60273201   | Highway and Traffic Engineering     | 3       | 3           | -         | 60232101              |
|                   |         | ✓            | 60274102   | Pavement Design                     | 3       | 3           | -         | 60273201+<br>60283101 |
|                   |         | ✓            | 60274103   | Pavement Lab.                       | 1       | -           | 2         | 60274102*             |
|                   |         | ✓            | 60283101   | Soil Mechanics                      | 3       | 3           | -         | 60232103              |
|                   |         | ✓            | 60283102   | Soil Mechanics Lab.                 | 1       | -           | 2         | 60283101*             |
|                   |         | ✓            | 60284203   | Foundation Engineering              | 3       | 3           | -         | 60283101              |



|              |   |          |  |           |           |           |                            |
|--------------|---|----------|--|-----------|-----------|-----------|----------------------------|
|              | ✓ | 60294302 | Civil Engineering Practical Training             | 3         | 3         | -         | Completion of 115 Cr. Hrs. |
| ✓            |   | 60295101 | Contracts, Specifications and Quantity Surveying | 3         | 3         | -         | 60375102                   |
|              | ✓ | 60295103 | Graduation Project (1)                           | 1         | 1         | -         | Completion of 118 Cr. Hrs. |
|              | ✓ | 60295204 | Graduation Project (2)                           | 2         | 2         | -         | 60295103                   |
| <b>Total</b> |   |          |  | <b>74</b> | <b>66</b> | <b>16</b> |                            |

\* Or Co-requisite

### B. Elective Requirements: (15) Credit Hours

| Knowledge fields            | Teaching type     |         |              | Course No. | Course Title                               | Cr. hr. | Theoretical | Practical | Prerequisite          |
|-----------------------------|-------------------|---------|--------------|------------|--|---------|-------------|-----------|-----------------------|
|                             | Online E-Learning | Blended | Face-to-Face |            |  |         |             |           |                       |
| Basics of civil engineering |                   | ✓       |              | 60234206   | Computer Applications in Civil Engineering | 3       | -           | 3         | 60253104+<br>60253205 |
|                             |                   | ✓       |              | 60235107   | Special Topics in Civil Engineering        | 3       | 3           |           | -                     |
| Structural engineering      |                   | ✓       |              | 60254107   | Reinforced Concrete Design (2)             | 3       | 3           | -         | 60253205              |
|                             |                   | ✓       |              | 60254208   | Seismic Engineering                        | 3       | 3           | -         | 60253104              |
|                             |                   | ✓       |              | 60254209   | Bridge Engineering                         | 3       | 3           | -         | 60273201              |
|                             |                   | ✓       |              | 60254210   | Pre-Cast Concrete                          | 3       | 3           | -         | 60253205              |
|                             |                   | ✓       |              | 60254211   | Pre-Stressed Concrete                      | 3       | 3           | -         | 60253205              |
|                             |                   | ✓       |              | 60254212   | High Rise Building                         | 3       | 3           | -         | 60253104+<br>60254106 |
| Environmental and water     |                   | ✓       |              | 60264206   | Environmental Impact Assessment (EIA)      | 3       | 3           | -         | 60264204              |
|                             |                   | ✓       |              | 60264207   | Waste Water                                | 3       | 3           | -         | 60264204              |





|                          |   |  |          |                                  |           |           |          |          |
|--------------------------|---|--|----------|----------------------------------|-----------|-----------|----------|----------|
|                          |   |  |          | Treatment                        |           |           |          |          |
|                          | ✓ |  | 60264208 | Solid Waste Management           | 3         | 3         | -        | 60264204 |
|                          | ✓ |  | 60264209 | Hydraulic Structure              | 3         | 3         | -        | 60263201 |
| Traffic engineering      | ✓ |  | 60274204 | Pavement Management Systems      | 3         | 3         | -        | 60274102 |
|                          | ✓ |  | 60274205 | Airport and Railway Engineering  | 3         | 3         | -        | 60273201 |
|                          | ✓ |  | 60274206 | Traffic Accidents Analysis       | 3         | 3         | -        | 60273201 |
| Geotechnical engineering | ✓ |  | 60284204 | Earth Retaining Structures       | 3         | 3         | -        | 60283101 |
|                          | ✓ |  | 60284205 | Soil Stability and Reinforcement | 3         | 3         | -        | 60283101 |
|                          | ✓ |  | 60284206 | Rock Mechanics                   | 3         | 3         | -        | 60283101 |
| Project management       | ✓ |  | 60295105 | Project Planning and Scheduling  | 3         | 3         | -        | 60375102 |
|                          | ✓ |  | 60295106 | Building Construction            | 3         | 3         | -        | 60375102 |
|                          | ✓ |  | 60295107 | Construction Methods             | 3         | 3         | -        | 60375102 |
| Surveying                | ✓ |  | 60234207 | Remote Sensing                   | 3         | 3         | -        | 60232101 |
|                          | ✓ |  | 60234208 | Geographical Information System  | 3         | 3         | -        | 60232101 |
|                          | ✓ |  | 60234209 | Advanced Surveying               | 3         | 3         | -        | 60232101 |
|                          |   |  |          | <b>Total</b>                     | <b>15</b> | <b>15</b> | <b>3</b> |          |

\* Or Co-requisite

### C. Ancillary Courses (20) Credit Hours:

| Teaching type     |         |              | Course No. | Course Title           | Cr. hr. | Theoretical | Practical | Prerequisite |
|-------------------|---------|--------------|------------|------------------------|---------|-------------|-----------|--------------|
| Online E-Learning | Blended | Face-to-Face |            |                        |         |             |           |              |
|                   | ✓       |              | 50212104   | Linear Algebra (I)     | 3       | 3           | -         | 50221101     |
|                   |         | ✓            | 50222209   | Differential Equations | 3       | 3           | -         | 50221202     |





|  |   |   |              |  |           |           |          |           |
|--|---|---|--------------|--|-----------|-----------|----------|-----------|
|  |   |   | (I)          |  |           |           |          |           |
|  | ✓ |   | 50223111     | Numerical Analysis (I)                   | 3         | 3         | -        | 50221101  |
|  | ✓ |   | 50231101     | Principles of Statistics and Probability | 3         | 3         | -        | -         |
|  | ✓ |   | 50551103     | General Chemistry                        | 3         | 3         | -        | -         |
|  |   | ✓ | 50551104     | General Chemistry Lab.                   | 1         | -         | 2        | 50551103* |
|  | ✓ |   | 50551201     | General Physics (2)                      | 3         | 3         | -        | 50551101  |
|  |   | ✓ | 50551202     | General Physics Lab. (2)                 | 1         | -         | 2        | 50551201* |
|  |   |   | <b>Total</b> |  | <b>20</b> | <b>18</b> | <b>4</b> |           |

\* Or Co-requisite

## Guidance plan

## First Year

| First Semester |   |           |              |              |
|----------------|---|-----------|--------------|--------------|
| Course No.     | Course Title                                | Cr. hrs.  | Prerequisite | Co-requisite |
| 50221101       | Calculus (I)                                | 3         | -            | -            |
| 50551101       | General Physics (I)                         | 3         | -            | -            |
| 50551102       | General Physics Lab. (I)                    | 1         | -            | 50551101     |
| 50551103       | General Chemistry                           | 3         | -            | -            |
| 50551104       | General Chemistry Lab.                      | 1         | -            | 50551103     |
| ---            | Compulsory/ Elective University Requirement | 3         | -            | -            |
| ---            | Compulsory/ Elective University Requirement | 3         | -            | -            |
| <b>Total</b>   |   | <b>17</b> |              |              |



## Second Semester

| Course No.   | Course Title                                | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|---|-----------|--------------|--------------|
| 50551201     | General Physics (2)                         | 3         | 50551101     | -            |
| 50551202     | General Physics Lab. (2)                    | 1         | -            | 50551201     |
| 50221202     | Calculus (2)                                | 3         | 50221101     | -            |
| 60221101     | Engineering Drawings                        | 2         | -            | -            |
| 60241201     | Statics                                     | 3         | 50551101     | -            |
| 60222102     | Introduction to Engineering                 | 1         | -            | -            |
| ---          | Compulsory/ Elective University Requirement | 3         | -            | -            |
| <b>Total</b> |   | <b>16</b> |              |              |

## Second Year

## First Semester

| Course No.   | Course Title                                | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|---|-----------|--------------|--------------|
| 60331204     | Engineering Workshops                       | 1         | -            | -            |
| 60232101     | Surveying                                   | 3         | 50221101     | -            |
| 60232102     | Surveying Lab.                              | 1         | -            | 60232101     |
| 50231101     | Principles of Statistics and Probability    | 3         | -            | -            |
| 60242102     | Strength of Materials                       | 3         | 60241201     | -            |
| 60252101     | Concrete Technology                         | 3         | 50551103     | -            |
| 60252102     | Concrete Technology Lab.                    | 1         | -            | 60252101     |
| ---          | Compulsory/ Elective University Requirement | 3         | -            | -            |
| <b>Total</b> |   | <b>18</b> |              |              |



### Second Semester

| Course No.   | Course Title                                | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|---|-----------|--------------|--------------|
| 60232103     | Engineering Geology                         | 3         | -            | -            |
| 50212104     | Linear Algebra (I)                          | 3         | 50221101     | -            |
| 60232204     | Materials Science                           | 3         | 50551103     | -            |
| 60242203     | Dynamics                                    | 3         | 60241201     | -            |
| 60252203     | Structural Analysis (I)                     | 3         | 60242102     | -            |
| ---          | Compulsory/ Elective University Requirement | 3         | -            | -            |
| <b>Total</b> |   | <b>18</b> |              |              |

### Third Year

#### First Semester

| Course No.   | Course Title                                 | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|--|-----------|--------------|--------------|
| 60372201     | Communication Skills and Professional Ethics | 3         | 50511105     | -            |
| 60243104     | Fluid Mechanics                              | 3         | 60242203     | -            |
| 60264103     | Fluid Lab.                                   | 1         | -            | 60243104     |
| 60253104     | Structural Analysis (2)                      | 3         | 60252203     | -            |
| 60283101     | Soil Mechanics                               | 3         | 60232103     | -            |
| 60283102     | Soil Mechanics Lab.                          | 1         | -            | 60283101     |
| 50223111     | Numerical Analysis (I)                       | 3         | 50221101     | -            |
| <b>Total</b> |  | <b>17</b> |              |              |



### Second Semester

| Course No.   | Course Title                                | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|---|-----------|--------------|--------------|
| 60264102     | Hydraulics                                  | 3         | 60243104     | -            |
| 60253205     | Reinforced Concrete Design (I)              | 3         |              | 60253104     |
| 60363203     | Programming for Engineers                   | 3         | 50511110     | -            |
| 60273201     | Highway and Traffic Engineering             | 3         | 60232101     | -            |
| ---          | Compulsory/ Elective University Requirement | 3         | -            | -            |
| ---          | Compulsory/ Elective University Requirement | 3         | -            | -            |
| <b>Total</b> |   | <b>18</b> |              |              |

\* Or Co-requisite

### Fourth Year

#### First Semester

| Course No.   | Course Title                    | Cr. hrs.  | Prerequisite          | Co-requisite |
|--------------|---------------------------------|-----------|-----------------------|--------------|
| 60263201     | Hydrology                       | 3         | 60243104              | -            |
| 60254106     | Steel Structures                | 3         | 60252203              | -            |
| 60234105     | Civil Engineering Drawings      | 2         | 60221101              | -            |
| 60274102     | Pavement Design                 | 3         | 60273201+<br>60283101 | -            |
| 60274103     | Pavement Lab.                   | 1         | -                     | 60274102     |
| ---          | Elective Department Requirement | 3         | -                     | -            |
| <b>Total</b> |                                 | <b>15</b> |                       |              |



### Second Semester

| Course No.   | Course Title                        | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|-------------------------------------|-----------|--------------|--------------|
| 50222209     | Differential Equations (I)          | 3         | 50221202     | -            |
| 60264204     | Water and Environmental Engineering | 3         | 50551103     | -            |
| 60264205     | Environmental Engineering Lab.      | 1         | -            | 60264204     |
| 60224203     | Engineering Economics               | 3         | 50221101     | -            |
| 60284203     | Foundation Engineering              | 3         | 60283101     | -            |
| ---          | Elective Department Requirement     | 3         | -            | -            |
| <b>Total</b> |                                     | <b>16</b> |              |              |

### Summer Semester

| Course No.   | Course Title                         | Cr. hrs. | Prerequisite               | Co-requisite |
|--------------|--------------------------------------|----------|----------------------------|--------------|
| 60294302     | Civil Engineering Practical Training | 3        | Completion of 115 Cr. Hrs. | -            |
| <b>Total</b> |                                      |          |                            |              |

- Practical training for eight consecutive weeks

### Fifth Year

#### First Semester

| Course No.   | Course Title                                | Cr. hrs.  | Prerequisite               | Co-requisite |
|--------------|---|-----------|----------------------------|--------------|
| 60375102     | Project Management                          | 3         | 60224203                   | -            |
| 60295103     | Graduation Project (I)                      | 1         | Completion of 118 Cr. Hrs. | -            |
| ---          | Elective Department Requirement             | 3         | -                          | -            |
| ---          | Elective Department Requirement             | 3         | -                          | -            |
| ---          | Compulsory/ Elective University Requirement | 3         | -                          | -            |
| <b>Total</b> |   | <b>13</b> |                            |              |



### Second Semester

| Course No.   | Course Title                                     | Cr. hrs.  | Prerequisite | Co-requisite |
|--------------|--|-----------|--------------|--------------|
| 60295204     | Graduation Project (2)                           | 2         | 60295103     | -            |
| 60295101     | Contracts, Specifications and Quantity Surveying | 3         | 60375102     | -            |
| ---          | Elective Department Requirement                  | 3         | -            | -            |
| ---          | Compulsory/ Elective University Requirement      | 3         | -            | -            |
| <b>Total</b> |  | <b>11</b> |              |              |

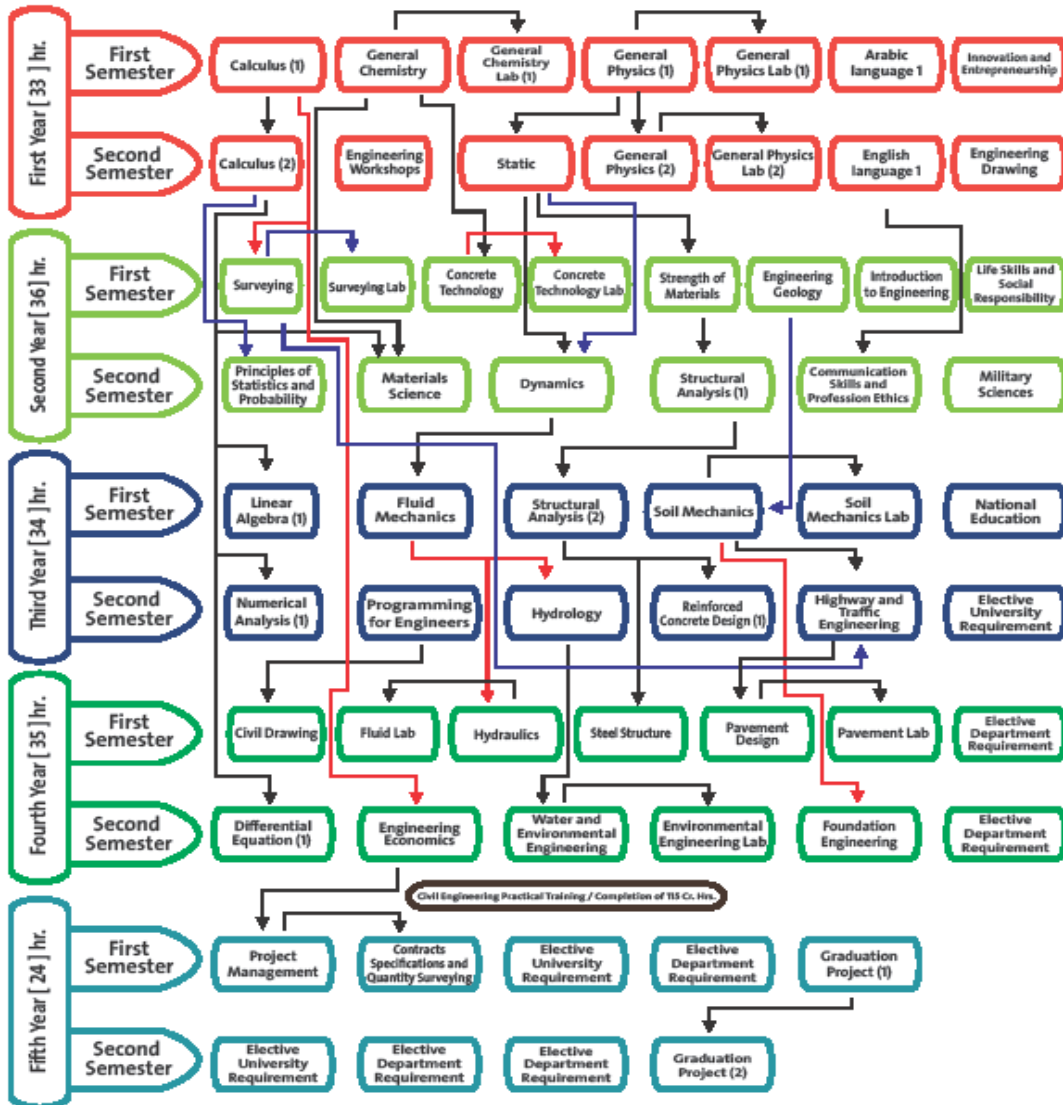


Courses Tree



Courses Tree

Faculty: Engineering      Department: Civil Engineering  
Major: Civil Engineering      Program: Bachelor      Issue Date: 2021/2022



F566, Rev. a  
Ref: Quality Assurance Council Session (08/2021-2022), Decision No.:01, Date:21/05/2022



F026-I, Rev. c  
Ref.: Deans' Council Session (35/2023-2024), Decision No.: 07, Date: 20/05/2024







## Course Description

**Course Number**   **Course Title**   **Credit Hours**   **Prerequisite**   **Condition**   **Type of Learning**  
**60221101 Engineering Drawings**   **2 Credit hrs.**   **Prerequisite: None**   **Condition: None**   **Type of Learning: Face to Face**

Instruments of drawing. Graphic geometry (Lines, letters, numbers, tangency construction). Intersections. Types of projections. Dimensioning. Plane sectioning.

**60222102 Introduction to Engineering**   **1 Credit hrs.**   **Prerequisite: None**   **Condition: None**  
**Type of Learning: Blended**

History of engineering. Difference between science and engineering. Development of engineering. Types of engineering. Functions of engineering. Jordanian Engineering Association. The effect of technology to engineering. Topics include goal setting and career assessment, ethics, public safety, the engineering method and design process.

**60224203 Engineering Economics**   **3 Credit hrs.**   **Prerequisite: 50221101**   **Condition: Register**  
**Type of Learning: Blended**

Principles of engineering economy. Types of economies. Demand & supply theory. Exclusive projects and alternatives. Cash flow diagram. Types of cash flows in any project. Simple & compound interest. Equivalence relations. Relation between present and future amounts. Present value analysis. Future value analysis. Annual value analysis. Capital cost analysis. Return on investment analysis. Selection of best projects. Major elements of feasibility studies.

**60363203 Programming for Engineers**   **3 Credit hrs.**   **Prerequisite: 50511110**   **Condition: Register**  
**Type of Learning: Face to Face**

Definition of a computer science and their systems, components, basic elements, software and equipment. Learn the basic programs such as (Microsoft Office, and learning Drawing Software (AutoCAD); Learn the skills to draw 2D engineering drawings.

**60372201 Communication Skills and Professional Ethics**   **3 Credit hrs.**   **Prerequisite: 50511105**  
**Condition: Register**   **Type of Learning: Blended**

General ideas about the writing styles and forms. Writing in business, industry and government. Adequacy and excellence. Analyzing the communication context. Basic writing techniques. Types of written communication. Revising for excellence. College writing and professional writing. Major types of on-job writing. Writing categories. Report writing procedures. Preparing own resumes. Practical experience on how to perform and attend interviews of work.



**60375102 Project Management 3 Credit hrs. Prerequisite: 60224203 Condition: Pass**  
**Type of Learning: Blended**

Definition of project. Definition of management & definition of project management. Project lifecycle & main and secondary project management domains. The project manager nomination and responsibilities, Techniques for project planning and scheduling, Gantt Chart & CPM method. Project progress measurement and project tracking by using earned value techniques.

**60331204 Engineering Workshops 1 Credit hrs. Prerequisite: None Condition: None**  
**Type of Learning: Face to Face**

It includes theoretical and practical topics covering four workshops: Welding workshop (including types of welding, general conditions to be provided, types of welding wires, qualification, prevention and public safety). Electrical workshop (including types of electrical circuits, household electrical wires, estimation of electric current and resistance). Blacksmithing workshop (tools and their types in perforating, filing and turning, leveling and sharpening metals). Carpentry workshop (including types of woods, machines and tools used in cutting, drilling, fixing and joining woods together).

**60232204 Materials Science 3 Credit hrs. Prerequisite: 50551103 Condition: Register**  
**Type of Learning: Blended**

Historical perspective. Classification of materials. Atomic structure and interatomic bonding. The structure of crystalline solids. Imperfections in solids. Mechanical properties of metals. Failure. Phase diagrams. Polymer structures, mechanical behavior and thermal properties.

**60232101 Surveying 3 Credit hrs. Prerequisite: 50221101 Condition: Register**  
**Type of Learning: Blended**

Introduction to surveying fundamentals. Units of measurements and scales. Chain surveying. Leveling and its application in contouring, profiles and cross-sections. Areas. Volumes. Earthwork calculations. Theodolite and its application in measurement of angles. Traverse surveys. Traverse coordinate calculations. Theory of errors and adjustments. Introduction to Total station.

**60232102 Surveying Lab. 1 Credit hrs. Prerequisite: 60232101\* Condition: Register**  
**Type of Learning: Face to Face**

Using traditional surveying equipment like chain and measuring tape. Leveling. Counteracting. Cross and longitudinal sections. Measuring vertical and horizontal angles using Theodolite. Use of Total Station.





**60232103 Engineering Geology 3 Credit hrs. Prerequisite: None Condition: None**  
**Type of Learning: Blended**

Identification of rock and minerals types. Soil properties. Weathering. Basic principles of the physical and structural geology of soils with emphasis related to civil engineering. Active tectonics and earthquakes hazards. Ground water. Slope stability and landslides.

**60234105 Civil Engineering Drawings 2 Credit hrs. Prerequisite: 60221101 Condition: Register**  
**Type of Learning: Face to Face**

Basic skills in construction drawing. Definition of methods for drawing and dropping civil structures (concrete and steel) such as buildings, culverts, concrete and steel bridges, irrigation canals and road sections.

**60241201 Statics 3 Credit hrs. Prerequisite: 50551101 Condition: Register**  
**Type of Learning: Face to Face**

Introduction to static forces and Newton's laws, SI units. Statics of particles, resultant of forces in 2D (planar) and 3D (space) equilibrium and free-body concept. Statics of rigid bodies, moments, force couples and equivalent force systems. Equilibrium of rigid bodies. Centers of gravity and centroids. Analysis of statically determinate structures including trusses, beams, frames etc. Distributed forces. Axial force, shear force and bending moment diagrams, Moment of inertia of combined shapes.

**60242102 Strength of Materials 3 Credit hrs. Prerequisite: 60241201 Condition: Register**  
**Type of Learning: Face to Face**

Concepts and types of stresses and strains. Stress-strain diagram. Mechanical properties of materials (modulus of elasticity, Poisson's ratio, and shear modulus). Axial (stress, strain, deformation, and compatibility). Internal forces for beams (axial, shear, and bending moment diagrams). Bending and shear stress. Torsional stresses, strains, and deformations. Compound stresses and strains. Maximum and minimum stresses and strains. Mohr circle. Buckling of compression members (Euler differential equation). Deflection of beams by double integration method.

**60242203 Dynamics 3 Credit hrs. Prerequisite: 60241201 Condition: Register**  
**Type of Learning: Blended**

Study the motion of translation and rotational bodies with and without acting forces. Newton's second law. Central movement of forces. Equation of energy. Work. Momentum. Collision. Conservation of energy and momentum. Applications on the motion systems. Acceleration and relative speed. Nonlinear center.

**60243104 Fluid Mechanics 3 Credit hrs. Prerequisite: 60242203 Condition: Register**  
**Type of Learning: Face to Face**



Fluid properties. Basic units. Fluid statics. Pressure and its measurements. Forces on plane and curved submerged surfaces. Buoyancy. Fluids in motion. Flow kinematics. Basic control volume approach. Differential and integral continuity equation. Euler's and Bernoulli's equations. Applications of Bernoulli equation. Hydraulic and energy grade lines. Momentum principle and its applications, Navier-Stokes equations. Dimensional analysis and simulation. Surface resistance. Introduction to boundary layer theory. Flow in conduits. Laminar and turbulent flows. Frictional and minor losses. Piping systems.

**60264103 Fluid Lab. 1 Credit hrs. Prerequisite: 60243104\* Condition: Register**  
**Type of Learning: Face to Face**

Center of pressure on a plane surface. Stability of a floating body. Venturi and orifice meters. Impact of jets. Flow over a rectangular notch. Flow over a weir. Head loss through pipes. Critical depth and specific energy. Flow under a sluice gate. Roughness of open channel. Hydraulic jump. Performance of impulse and reaction turbines. Performance characteristics of a centrifugal pump.

**60252101 Concrete Technology 3 Credit hrs. Prerequisite: 50551103 Condition: Register**  
**Type of Learning: Blended**

Cement types. Manufacturing process of cement. Properties of cement. Cement hydration process. Properties of aggregates. Fresh concrete: workability, segregation and mixing tests of fresh concrete. Hardened Concrete: strength of concrete, shrinkage and creep, durability of concrete, mix design calculations, masonry units, concrete blocks and admixtures.

**60252102 Concrete Technology Lab. 1 Credit hrs. Prerequisite: 60252101\* Condition: Register**  
**Type of Learning: Face to Face**

Laboratory tests are conducted on concrete raw materials. Specific weight, absorption, corrosion, crushing and impact of aggregates. Setting time of cement. Drop rate, coefficient of compaction and void ratio of fresh concrete. Breaking and bending strength of both cubes and cylinders hardened concrete specimens. Non-destructive tests such as Schmidt's hammer.

**60252203 Structural Analysis (1) 3 Credit hrs. Prerequisite: 60242102 Condition: Pass**  
**Type of Learning: Face to Face**

Introduction to structural forces (static, and dynamic, concentrated and distributed, nature of forces. Equilibrium and determinacy of structures. Analysis of Internal forces for determinate frames and arches (axial, shear, and bending moment diagrams). Analysis of influence lines for determinate. Force method. Virtual work method.

**60253104 Structural Analysis (2) 3 Credit hrs. Prerequisite: 60252203 Condition: Register**  
**Type of Learning: Face to Face**





Displacement method, Slope-deflection method. Moment-distribution method. Analysis of indeterminate structures by stiffness methods i.e. matrix method (for sway and none sway structures). Analysis of influence lines for indeterminate structure (beams, frames, arches and trusses. determination of deflection of frames and trusses. Analysis of indeterminate frame and trusses. Three-moment equation and its applications to solving indeterminate beams and frames.

**60254106 Steel Structures 3 Credit hrs. Prerequisite: 60252203 Condition: Register**  
**Type of Learning: Face to Face**

Introduction to the behavior and design of steel structures. Properties and codes of steel structures. Loads and design philosophies (LRFD). Design of tension members. Design of compression members (columns). Design of beams. Design of beam-columns. Design of connections.

**60253205 Reinforced Concrete Design (I) 3 Credit hrs. Prerequisite: 60253104\***  
**Condition: Register Type of Learning: Face to Face**

Properties of concrete and steel materials, types of loads and loads combinations. Concept of concrete design. Serviceability stress method, cracked and un-cracked sections. Ultimate limited strength method. Design of beams. Analysis and design of singly reinforced sections, ductile, balanced, and brittle sections, doubly reinforced rectangular sections, flanged sections. Design for shear forces. Design of columns. Analysis of concentric eccentric short columns, Design of one-way slab.

**60263201 Hydrology 3 Credit hrs. Prerequisite: 60243104 Condition: Register**  
**Type of Learning: Face to Face**

Introduction to the hydrologic cycle and its components. Precipitation, evaporation and transpiration, infiltration, stream flow, rainfall-runoff analysis and its application, peak flow calculations, flood routing. Hydrologic forecast and design criteria, Flood estimation and control.

**60264102 Hydraulics 3 Credit hrs. Prerequisite: 60243104 Condition: Register**  
**Type of Learning: Face to Face**

Open channels flow, steady uniform flow in open channels, and energy principles in open channel. Total energy and specific energy, specific energy diagram, critical flow and depth, critical slope, applications of energy principle, gradually varied flow in open channels, derivation of gradually varied flow equation, weirs and spillways, momentum principles in open channels, Hydraulic jump, fluid measurements, hydro-machinery, pumps and turbines.

**60264204 Water and Environmental Engineering 3 Credit hrs. Prerequisite: 50551103**  
**Condition: Pass Type of Learning: Blended**





Introduction to environmental engineering. Causes of the deterioration of the current state of the global environment. Units and standards used in environmental sciences and engineering. Various environmental laws, standards, methods and types for evaluating the various elements of the environment and ensuring their quality (Mass and Energy Transfer; Environmental Chemistry). Water quality and properties (Water Pollution). Air Pollution and progress in controlling its quality.

**60264205 Environmental Engineering Lab. 1 Credit hrs. Prerequisite: 60264204\***  
**Condition: Register Type of Learning: Face to Face**

Water and Wastewater Analysis including solids determination, spectrophotometry, pH, turbidity, alkalinity, acidity, hardness, acid-base titration, biological and chemical oxygen demands, bacterial counts in water, coliform tests and heavy metals determination and trace contaminants.

**60273201 Highway and Traffic Engineering 3 Credit hrs. Prerequisite: 60232101**  
**Condition: Register Type of Learning: Face to Face**

Highway types. Characteristics of road, pedestrian, vehicles and drivers. Highway classification. Design of horizontal and vertical alignments. Design of cross-section elements. Sight distance. Super elevation attainment. Highway water drainage system. Traffic flow elements: traffic volume, speed and delay studies. Traffic data collection. Travel time studies. Introduction to traffic control. Capacity and level of service analysis of basic highway segments. Signalized and un-signalized intersections. Signal timing. Two-lane highway and multilane highway free flow speed estimating, Pedestrian-Flow models and level of service. Highway safety. Traffic calming devices. Parking Studies.

**60274102 Pavement Design 3 Credit hrs. Prerequisite: 60273201+60283101**  
**Condition: Register Type of Learning: Face to Face**

Types of pavement (flexible and rigid). Stress. Strain. Deflection analysis in flexible and rigid pavement. Soil for Highway. Design Traffic loading and volume. Equivalent single-wheel load, Structural design of flexible and rigid pavement. Pavement materials. Asphalt concrete mix design using Marshall and Superpave method (specifying optimum asphalt content). Pavement distresses.

**60274103 Pavement Lab. 1 Credit hrs. Prerequisite: 60274102\* Condition: Register**  
**Type of Learning: Face to Face**

Highway material test. Characteristics and tests of bituminous material (asphalt). Marshall Test. CBR test.

**60283101 Soil Mechanics 3 Credit hrs. Prerequisite: 60232103 Condition: Pass**  
**Type of Learning: Face to Face**





Composition and structure of soils. Soil phases' 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. Secondary compression. Shear strength of soils.

**60283102 Soil Mechanics Lab. 1 Credit hrs. Prerequisite: 60283101\* Condition: Register Type of Learning: Face to Face**

Specific gravity test. Dry screening using sieve analysis. Wet analysis (Hydrometer test). Water content, Atterberg Limits: Liquid limit, Plastic limit, and Shrinkage limit. Standard and modified Proctor compaction tests. In situ field test. Permeability test (constant and falling head tests), Triaxial shear test. Unconfined compression test. Direct shear test.

**60284203 Foundation Engineering 3 Credit hrs. Prerequisite: 60283101 Condition: Pass Type of Learning: Face to Face**

Review of basic soil mechanics. Types of shallow foundations. Bearing capacity of foundations. Settlement. Geometric design of isolated footings. Special types of footings: rectangular, combined, strap footings and mat foundations. Lateral earth pressure and retaining walls. Introduction to deep foundations.

**60295101 Contracts, Specifications and Quantity Surveying 3 Credit hrs. Prerequisite: 60375102 Condition: Register Type of Learning: Blended**

Engineering definitions. Categories & legal aspects of engineering construction works. General and special conditions of contracts FIDIC and their different types of books. Specifications of construction works. Quantity surveying for civil engineering works. Contractual procedures. Types of contracts. Contract documents. Bills of quantities. Specification drafting. Quantity measurement.

**60295103 Graduation Project (1) 1 Credit hrs. Prerequisite: Completion of 118 Cr. Hrs. Condition: Pass Type of Learning: Face to Face**

Directed readings in the literature of civil engineering. Introduction to research methods. Seminar discussions dealing with special engineering topics of current interest. It is the first phase of the project.

**60295204 Graduation Project (2) 2 Credit hrs. Prerequisite: 60295103 Condition: Register**

The student or group of students selects a theoretical or practical project related to the cognitive domains of the civil engineering discipline. At the end of the project, the student should undertake a comprehensive examination and submit a technical report along with an illustrated presentation of the project.

**60294302 Civil Engineering Practical Training 3 Credit hrs. Prerequisite: Completion of 115 Cr. Hrs. Condition: Pass Type of Learning: Face to Face**





Practical training in a civil engineering project or any other places approved by the department, in accordance with regulations drafted by the training committee at the faculty of engineering.

**60234206 Computer Applications in Civil Engineering 3 Credit hrs. Prerequisite:**  
**60253104+60253205 Condition: Register Type of Learning: Blended**

Practical applications in computer software that cover different disciplines in civil engineering topics.

**60254107 Reinforced Concrete Design (2) 3 Credit hrs. Prerequisite: 60253205**  
**Condition: Register Type of Learning: Blended**

Design of one-way solid slabs, design of one way ribbed slab, introduction to two-way solid slab. Design of two-way slabs (solid and ribbed) by coefficient method, direct design method. Types of loads and load combination. Analysis and design of sway and no sway slender columns. Analysis of retaining walls. Calculation and check of deflection, crack width, and vibration. Analysis and design for torsion.

**60254208 Seismic Engineering 3 Credit hrs. Prerequisite: 60253104 Condition:**  
**Register Type of Learning: Blended**

Nature of earthquake and seismic hazard maps. Structural dynamics (single and multi-degree) response spectra. Analysis by Uniform Building Code UBC97. Analysis by International Building Code IBC. Design of beams, columns, shear walls, and joints subjected to seismic loads.

**60254209 Bridge Engineering 3 Credit hrs. Prerequisite: 60273201 Condition:**  
**Register Type of Learning: Blended**

Types of bridges in terms of shape and material. Bridge Design Process. Types of Superstructures. Traffic and drainage design of bridges. Loads and load combination. Material reduction factors. Design of slab bridges. Design of T-beam bridges. Design of pre-stressed bridges. Design of steel bridges. Design of supports. Design of abutments. Maintenance of bridges.

**60254210 Pre-Cast Concrete 3 Credit hrs. Prerequisite: 60253205 Condition:**  
**Register**

Precast structures – halls, skeletons, building from flat and spatial units. Type of units (columns, roof and floor elements, wall panels). Arrangement and details of connections. Calculation of precast units and structures, joint members. Spatial rigidity of precast constructions. Special units and structures.

**60254211 Pre-Stressed Concrete 3 Credit hrs. Prerequisite: 60253205 Condition:**  
**Register Type of Learning: Blended**

Basic principles. Short- and long-term properties of constituent materials. Partial pre-stressing. Flexural behavior. Analysis and design of pre-stressed 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.

**60254212 High Rise Building 3 Credit hrs. Prerequisite: 60253104 + 60254106**  
**Condition: Register**

High-rise building functional requirements as well as technologies and processes used in high-rise building construction. Topics covered in this course include foundation systems; typical vertical and horizontal loads on high-rise buildings, structural systems including structural steel construction and reinforced concrete construction; enclosure systems; material handling and management including selection of cranes, hoists, and concrete pumps; high-rise building services; and interior fit-out of high-rise buildings.

**60264206 Environmental Impact Assessment (EIA) 3 Credit hrs. Prerequisite: 60264204**  
**Condition: Register Type of Learning: Blended**

The methodology of environmental impact assessment (EIA) as a vital tool for sound environmental management and decision-making. The course provides an overview of the concepts, methods, issues and various forms and stages of the EIA process. Different levels and systems of EIA are examined to highlight the diversity of approach and impact of the EIA process.

**60264207 Waste Water Treatment 3 Credit hrs. Prerequisite: 60264204 Condition:**  
**Register Type of Learning: Blended**

Sources of wastewater, quantities and quality. Primary treatment for removal of suspended solids. Chemical reaction and reactor type. Secondary treatment: activated sludge, trickling filters, and stabilization ponds. Management of treatment residuals. Design of sewer systems.

**60264208 Solid Waste Management 3 Credit hrs. Prerequisite: 60264204 Condition:**  
**Register Type of Learning: Blended**

Understand, classify and manage solid wastes. Identify of different solid waste sources. Identify the characteristics of solid waste. Suggest suitable actions and plans to handle different situations. Understand modern treatment technologies and regulations as well as sustainability of the chosen technology. Evaluate different case studies.

**60264209 Hydraulic Structure 3 Credit hrs. Prerequisite: 60263201 Condition:**  
**Register**

Design Discharge: run-off, design flood and estimation of peak flood. Seepage and uplift pressure. Hydraulic jump and energy dissipation devices: normal and sequent depths, forms, energy dissipaters and stilling basin, and U/S





and D/S protections. Control structures: diversion works, weirs, sediment control devices, falls and transitions. Cross drainage works; culverts and outlet works.

**60274204 Pavement Management Systems 3 Credit hrs. Prerequisite: 60274102**  
**Condition: Register Type of Learning: Blended**

The principles and practices of evaluation, analysis, design, performance prediction, planning and maintenance of highway pavements.

**60274205 Airport and Railway Engineering 3 Credit hrs. Prerequisite: 60273201**  
**Condition: Register Type of Learning: Blended**

Introduction to airport engineering. Aircraft characteristics. Airport site selection. Airport traffic control. Airport geometric design. Airport pavement design. Terminal design. Airport marking, Lighting and signing.

**60274206 Traffic Accidents Analysis 3 Credit hrs. Prerequisite: 60273201**  
**Condition: Register Type of Learning: Blended**

Traffic Accident. Patterns of traffic accidents. Accident data, Analysis of accident data. Hazardous locations, Countermeasures. Accident cost. The importance of highway safety, Operational considerations for safety. Issues involved in transportation safety. Causes of crashes, Factors involved in crashes. The Highway safety improvement program. Collecting and maintaining hazardous locations and elements. Conducting engineering studies. Schedule and implement safety improvement projects. Determine the effect of highway safety improvements. Traffic control methods and devices.

**60284204 Earth Retaining Structures 3 Credit hrs. Prerequisite: 60283101**  
**Condition: Register Type of Learning: Blended**

Introduction to soil mechanics to recognize, design and analyze concrete retaining walls, MSE walls, cantilever and anchored sheet pile walls. Braced excavations. Cofferdams using conventional and Load and Resistance Factor Design (LRFD) concepts.

**60284205 Soil Stability and Reinforcement 3 Credit hrs. Prerequisite: 60283101**  
**Condition: Register Type of Learning: Blended**

Fundamentals and advanced concepts of stability analysis for earth slopes and retaining walls with soil backfill. Topics: shear strength, effective/total stress analysis, infinite/finite slopes, reinforced soil slopes, lateral earth pressure, retaining wall design and reinforced soil retaining walls.

**60284206 Rock Mechanics 3 Credit hrs. Prerequisite: 60283101**  
**Condition: Register Type of Learning: Blended**





The behavior of rocks under the influence of loading or unloading. Mechanical behavior of rock and rock masses, the engineering properties of rock and techniques for the classification of rock masses and analysis of rock structures.

**60295105 Project Planning and Scheduling 3 Credit hrs. Prerequisite: 60375102**  
**Condition: Register Type of Learning: Blended**

Study of the concepts used in planning and scheduling of projects in both industrial and construction applications by using Gantt chart, CPM methods & PERT method. Principles of Cost Estimation for projects.

**60295106 Building Construction 3 Credit hrs. Prerequisite: 60375102 Condition:**  
**Register Type of Learning: Blended**

Identifying different methods of construction, regulations particularly the basic building stages, the organization of the site, earthworks, foundations, walls, floors, ceilings, stairs, steel, molds, scaffolding, formwork, blocks, bricks, stone, insulation, finishing works, safety precautions & doors and windows ... etc. How to set up detailed working drawings and how to choose the most suitable building materials. Review construction methods, machinery available, and the stages of construction. Physical and engineering properties of building materials, use and performance in different environments. Engineering tests required for construction materials and how they are implemented in laboratory or at site.

**60295107 Construction Methods 3 Credit hrs. Prerequisite: 60375102**  
**Condition: Register Type of Learning: Blended**

Introduction to project planning and management. Integrated reading of project list of formal documents. Evaluation of the factors affecting the selection of construction equipment methods for different projects. Engineering fundamentals of excavations, moving earth and soil stabilization and compaction. General knowledge on different construction equipment such as loaders, excavator, jackhammers, scrapers, & trucks. Piles and pile driving equipment. Pumping equipment. Tunneling equipment. Design of formwork, trench support and cofferdams.

**60234207 Remote Sensing 3 Credit hrs. Prerequisite: 60232101 Condition:**  
**Register Type of Learning: Blended**

Introduction to remote sensing techniques. Forms of energy-material interaction. Remote sensing devices and systems. Supplies, sources and uses of remote sensing techniques. Importance of remote sensing technology in the study of geomorphology and geometry.

**60234208 Geographic Information System 3 Credit hrs. Prerequisite: 60232101**  
**Condition: Register Type of Learning: Blended**





Study the 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. Maps, projection and datum, Data management and planning.

**60234209 Advance Surveying 3 Credit hrs. Prerequisite: 60232101 Condition:  
Register Type of Learning: Blended**

Advanced topics in surveying computations and procedures, including traverse error analysis, topographic surveying, mapping, astronomical observations, coordinate geometry applications. Introduction to geodesy and state plane coordinates.

**60235107 Special Topics in Civil Engineering, 3 Credit hrs. Type of Learning: Blended**

"Special Topics in Civil Engineering" offer students a unique opportunity to explore specialized areas of interest within various knowledge areas, and latest trends in Civil Engineering, equipping them with the knowledge, and skills essential for addressing complex challenges in Civil Engineering.