**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Work Engineering department |
| **Course Code** | PWE 8416 |
| **Year/ Level** | Fourth Year |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 2 | Apply knowledge of Remote Sensing and Photogrammetry in meteorology, geology and vegetation science . |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | Apply Laser imaging principles and techniques in surveying applications |
| C1.2 | Apply remote sensing science techniques in meteorology, geology and vegetation science |
| C3.1 | Manage construction sites survey field work by remote sensing electromagnetic wave . |
| C3.2 | Address constructions layout by aerial photographs and satellite images. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Laser imaging principles and techniques. | 1-3 |
| 2 | development of remote sensing science | 4-7 |
| 3 | properties of electromagnetic wave | 9-10 |
| 4 | properties of aerial photographs and satellite images | 11-14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |

| | |
|---|---|
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination | C1.1 , C1.2 |
| **2** | Final Term Examination | C1.1 , C1.2 , C3.1 , C3.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination | 8 |
| **2** | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 33 % |
| **2** | Final Term Examination | 67 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Miklas Scholz, “Chapter 21 - Sludge Treatment and Disposal” (2016) |
| **2** | Vivek V. Ranade, Vinay M. Bhandari, “Chapter 1 - Industrial Wastewater Treatment, Recycling, and Reuse: An Overview” (2014) |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Laser imaging principles and techniques. | 2 | C1.1 |
| 2 | development of remote sensing science | 2 | C1.2 |
| 3 | properties of electromagnetic wave | 2 | C3.1 |
| 4 | properties of aerial photographs and satellite images | 2 | C3.2 |

**Course Coordinator:**

محمد السعيد السيد محمود زهران

**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Remote Sensing | |
|---|---|
| **Program LOs** | **Course LOs** |
| **C1**. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 Apply Laser imaging principles and techniques in surveying applications.<br><br>C1.2 Apply remote sensing science techniques in meteorology, geology and vegetation science . |
| **C3.** Plan and manage construction processes; address construction defects, instability, and quality issues; maintain safety measures in construction and materials. | C3.1 Manage construction sites survey field work by remote sensing electromagnetic wave .<br><br>C3.2 Address constructions layout by aerial photographs and satellite images. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Work Engineering department |
| **Course Code** | PWE 8416-1 |
| **Year/ Level** | Fourth Year |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of asphalt concrete mixes from the perspective of strength, durability, weather conditions and environment. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | Apply Marshall Method concepts in asphalt Mixes Designs for construction of roads. |
| C1.2 | Apply Foamed Asphalt technologies for construction of roads |
| C2.1 | Achieve an optimum design of Super pave asphalt binder according to performance, Specifications, and testing . |
| C2.2 | Achieve Modern Mechanistic based method for Mix Design . |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Introduction. | 1-3 |
| 2 | Marshall Method. | 4-7 |
| 3 | Foamed Asphalt. | 9-11 |
| 4 | Super pave asphalt binder performance, Specifications and testing. | 12-13 |
| 5 | Modern Mechanistic based method for Mix Design. | 14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination | C1.1 , C1.2 |
| **2** | Semester work | C2.1 |
| **3** | Final Term Examination | C1.1 , C1.2 , C2.1 , C2.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination | 8 |
| **2** | Semester work | weekly |
| **3** | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 20 % |
| **2** | Semester work | 8 % |
| **3** | Final Term Examination | 72 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | E. Ray and Prithvi S. Kandhal and Freddy L. Roberts and Y. Richard Kim and Dah-Yinn Lee and Thomas W. Kennedy Brown, "Hot Mix Asphalt Materials, Mixture Design, and Construction", NCAT, 3rd edition, 2009. |
| **2** | Athanassios Nikolaides, "Highway Engineering pavement, Materials and Control of Quality", 2017. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction. | 6 | C 1.1 |
| 2 | Marshall Method. | 6 | C 1.1 |
| 3 | Foamed Asphalt. | 6 | C 1.2 |
| 4 | Super pave asphalt binder performance, Specifications and testing. | 6 | C 2.1 |
| 5 | Modern Mechanistic based method for Mix Design. | 6 | C 2.2 |

**Course Coordinator:**

Sherief Masoud Ahmed El Badwy

Ahmed Mohamed Metwaly Awad

**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Modern Trends in Asphalt Paving Design Mixes | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 Apply Marshall Method concepts in asphalt Mixes Designs for construction of roads.<br><br>C1.2 Apply Foamed Asphalt technologies for construction of roads . |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of Super pave asphalt binder according to performance, Specifications and testing.<br><br>C2.2 Achieve Modern Mechanistic based method for Mix Design. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering department |
| **Course Code** | STE 8411 |
| **Year/ Level** | fourth year – first semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 4 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 7 | Use the codes of practice of soil mechanics and foundation in design of pile foundation ,dewatering systems and earth retaining structures. |

## 3. Learning Outcomes (ILOs):

| | |
|---|---|
| A10.1 | Acquire new knowledge about deep foundations |
| C7.1 | Design different types of pile foundation, earth retaining structures, dewatering systems. |

## 4. Course Contents:

| No. | Topi | week |
|---|---|---|
| 1 | Introduction to soil hydraulics | W1 |
| 2 | hydraulic Conductivity determination | W2,W3 |
| 3 | Flow through porous media | W4,W5 |
| 4 | One dimensional flow | W6,W7 |
| 5 | Two dimensional flow | W9,W10 |
| 6 | Sheet pile design | W11 |
| 7 | Determination of pile capacity | W12,W13 |
| 8 | Design of pile cap | W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term | C7.1, A10.1 |
| 2 | Oral/practical | C7.1, A10.1 |
| 3 | Semester work | C7.1, A10.1 |
| 4 | Final Term | C7.1, A10.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 8 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | weekly |
| 3 | Oral examination | 14 |
| 4 | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 13.3% |
| **2** | Semester work (Quizzes, presentation, Portfolio) | 13.3% |
| 4 | Oral examination | 6.6% |
| **5** | Final Term Examination | 66.6% |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Pile Design and Construction Practice - Michael Tomlinson, John Woodward (2015) |
| **2** | Deep Excavations in Soil -John Endicott (2020) |

## 9. Facilities Required for Teaching and Learning:

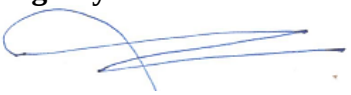
| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | ILO's |
|---|---|---|---|
| 1 | Introduction to soil hydraulics | 7 | C7.1, A10.1 |
| 2 | hydraulic Conductivity determination | 7 | C7.1, A10.1 |
| 3 | Flow through porous media | 7 | C7.1 |
| 4 | One dimensional flow | 7 | C7.1 |
| 5 | Two dimensional flow | 7 | C7.1 |
| 6 | Sheet pile design | 7 | C7.1 |
| 7 | Determination of pile capacity | 7 | C7.1 |
| 8 | Design of pile cap | 7 | C7.1 |

**Course Coordinator:**

- Ass. Prof. Ayman Ibrahim El-tahrany 

**Head of Department: Prof. Dr. Mohamed El-Zoughiby** 

**Date of Approval: December 2021**

| **Course: Soil mechanics and foundations 2** | |
|---|---|
| **Program ILOs** | **Course ILOs** |
| **A10.** Acquire and apply new knowledge, and practice self, lifelong and other learning strategies. | **A10.1:** Acquire new knowledge about deep foundations |
| **C7.** Design and construct structures for protection against dangers of unexpected natural events such as floods and storms | **C7.1** Design different types of pile foundation, earth retaining structures, dewatering systems. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8414 |
| **Year/ Level** | Third year - First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 2 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 5 | Lead and Communicate the project stakeholders effectively with full planning and scheduling for construction projects; and analyze its cash flow with resource and risk management. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| B3.1 | Communicate effectively with Project Stakeholders and display professional and ethical responsibilities during Procurement stage. |
| B3.2 | Define PERT method and Networks for Project Scheduling. |
| B4.1 | Deal with Tender types and Tender preparation for construction projects. |
| B4.2 | Treat with Cash Flow analysis thinking and Project controlling. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Projects Characteristics | W1 |
| 2 | Contracts and organizational structure | W2,W3 |
| 3 | Planning | W4,W5 |
| 4 | Scheduling | W6,W7 |
| 5 | Resources Management | W9 |
| 6 | Schedule Compression (Time-cost Trade-off) | W10,W1 |
| 7 | Estimating Direct and Indirect Cost and Cash Flow Analysis | W12,W1 |
| 8 | Time and Cost Control | W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | B3.1, B3.2 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | B3.2, B4.1 |
| 3 | Final Term Examination | B3.2, B4.1, B4.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 8 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | weekly |
| 3 | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | 15% |
| 2 | Semester work (Quizzes, presentation, Portfolio) | 15% |
| 3 | Final Term Examination | 70 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | ***Hegazy, T., "Computer-Based Construction Project Management", 2002.*** |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Projects Characteristics | 5 | B4.1 |
| 2 | Contracts and organizational structure | 5 | B3.1 , B3.2 |
| 3 | Planning | 5 | B3.2 |
| 4 | Scheduling | 5 | B4.1 |
| 5 | Resources Management | 5 | B4.2 |
| 6 | Schedule Compression (Time-cost Trade-off) | 5 | B4.1, B4.2 |
| 7 | Estimating Direct and Indirect Cost and Cash Flow Analysis | 5 | B2.1, B2.2 |
| 8 | Time and Cost Control | 5 | B3.1, B4.1 |

**Course Coordinator:** Prof. Dr/ Ibrahim Ahmed Motawa

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**

**Date of Approval: December 2021**

| Course: Construction project management | |
|---|---|
| **Program LOs** | **Course LOs** |
| B3. Lead and Communicate effectively with multidisciplinary teams and display professional and ethical responsibilities; and contextual understanding to Manage and supervise construction project. | B3.1- Communicate effectively with Project Stakeholders and display professional and ethical responsibilities during Procurement stage.<br><br>B3.2- Define PERT method and Networks for Project Scheduling. |
| B4. Deal with biddings, contracts and financial issues including project insurance and guarantees | B4.1- Deal with Tender types and Tender preparation for construction projects<br><br>B4.2- Treat with Cash Flow analysis thinking and Project controlling. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8415 |
| **Year/ Level** | Fourth Year- First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of projects in different disciplines including structural engineering Consist of Bearing Walls. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | apply a full range of Structural engineering concepts of Structural Analysis and Mechanices. |
| C1.2 | Select appropriate design of Bricks and Lentils according to the Egyptian code. |
| C2.1 | Achieve an optimum design of Bearing Wall structures. |
| C2.2 | Achieve an optimum design of Vertical loads for Bearing wall structure elements |

## 4. Course Contents:

| No. | T | week |
|---|---|---|
| 1 | Components of Bricks, types of structural's and properties of brick materials | W1 , W2 , W3 |
| 2 | Types of Brick mortars and reinforcement | W4 ,W 5 , W6 |
| 3 | Behavior of brick walls under compression, shear, and bending | W7 , W9 |
| 4 | bending for reinforced beams and lentils | W10 , W11 ,W12 |
| 5 | Analysis and design of reinforced and non-reinforced brick walls | W13 ,W 14 |
| 6 | Design of shear walls and its behavior under shear and bending | W14 |
| 7 | Components of Bricks, types of structural's and properties of brick materials | W1 , W2 ,W 3 |

| | | |
|---|---|---|
| 8 | Types of Brick mortars and reinforcement | W4 , W5 , W6 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Semester work | C1.1 , C1.2 |
| 2 | Final Examination | C1.1 , C1.2 , C2.1 , C2.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Semester work (Quizzes, presentation, Portfolio) | weekly |
| 2 | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **2** | Semester work (Quizzes, presentation, Portfolio) | 33 % |
| **4** | Final Term Examination | 67 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Egyptian Code for Design and Construction of reinforced concrete structures 2018 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Components of Bricks, types of structural's and properties of brick materials | 6 | C1.1 |
| 2 | Types of Brick mortars and reinforcement | 6 | C1.1 |
| 3 | Behavior of brick walls under compression, shear, and bending | 6 | C2.1 |
| 4 | bending for reinforced beams and lentils | 6 | C2.1 |
| 5 | Analysis and design of reinforced and non-reinforced brick walls | 6 | C2.1 |
| 6 | Design of shear walls and its behavior under shear and bending | 6 | C2.1 |
| 7 | Components of Bricks, types of structural's and properties of brick materials | 6 | C2.2 |
| 8 | Types of Brick mortars and reinforcement | 6 | C2.2 |

**Course Coordinator:** Prof. Dr. Ahmed Tahawya

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**

**Date of Approval: December 2021**

| **Course: Design of earthquake resistant structures** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanices, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 apply a full range of Earthquake engineering and Dynamics of Structures concepts of Structural Analysis and Mechanices.<br><br>C1.2 Select appropriate Seismic design of beams, columns and beam-column joints according to the Egyptian code. |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of earthquake resistant design of structures.<br><br>C2.2 Achieve an optimum design of elements under earthquake type loading |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8415 |
| **Year/ Level** | Fourth Year- Second Semester: |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | - |

## 2. Course aims:

| No. | aim |
|---|---|
| 6 | Design different types of advanced concrete in different disciplines using new building materials. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C5.1 | Select appropriate building materials from the perspective of strength, durability, suitability to use it in design of advanced concrete. |
| C6.1 | Design construction buildings using waste and new materials to protect the environment and achieve good properties. |

## 4. Course Contents:

| No. | T | Week |
|---|---|---|
| 1 | Introduction of a New Technology of Material | W1 , W2, W3 |
| 2 | Classification of Composite Materials | W4 ,W 5 |
| 3 | Properties of Composite Materials | W6 ,W 7 |
| 4 | Carbon Fiber and Uses in Construction | W9 , W10 , W11 |
| 5 | Damp Proofing Material and Heat Insulation | W12 , W13 , W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion lessons |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods 0f Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C5.1 |
| 2 | Semester work | C5.1 |
| 5 | Final Term Examination | C5.1, C6.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Semester work (Formative - quizzes – presentation) | Weekly |
| 5 | Final Term Examination (written) | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 20 |
| 2 | Semester work (Formative - quizzes – presentation) | 13 |
| 5 | Final Term Examination (written) | 67 |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | *Zhang, "Building Materials in Civil Engineering"*, 2016. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Visualizer |
| 6 | Presenter |
| 7 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction of a New Technology of Material | 6 | C5.1 |
| 2 | Classification of Composite Materials | 6 | C5.1 |
| 3 | Properties of Composite Materials | 6 | C5.1,C6.1 |
| 4 | Carbon Fiber and Uses in Construction | 6 | C5.1 |
| 5 | Damp Proofing Material and Heat Insulation | 6 | C5.1 |

**Course Coordinator:** Prof. Dr. Ahmed Tahawya

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**

**Date of Approval:December 2021**

| **Course: Advanced construction materials** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1 Select appropriate building materials from the perspective of strength, durability, suitability to use it in design of advanced concrete. |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 Design construction buildings using waste and new materials to protect the environment and achieve good properties. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8415 |
| **Year/ Level** | Fourth Year- First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of projects in different disciplines including structural engineering subjected to Earthquakes Loads. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | apply a full range of Earthquake engineering and Dynamics of Structures concepts of Structural Analysis and Mechanices. |
| C1.2 | Select appropriate Seismic design of beams, columns and beam-column joints according to the Egyptian code. |
| C2.1 | Achieve an optimum design of earthquake resistant design of structures. |
| C2.2 | Achieve an optimum design of elements under earthquake type loading |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | - Introduction to earthquake engineering | W1 |
| 2 | - Earthquake Nature - Earthquake hazards - Seismic waves – Earthquake scales | W2-W3 |
| 3 | - Introduction to dynamics of structures | W4 |
| 4 | - solution of equation of motion of multi-degree of freedom structures | W5 |
| 5 | - design response spectrum for different soil types | W6-W7 |
| 6 | - behavior of structures and structural elements under earthquake type loading | W9 |
| 7 | - Principles of earthquake resistant design of structures – Equivalent lateral force method | W10-W12 |
| 8 | - Seismic design of beams, columns and beam-column joints according to the Egyptian code. | W13-W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1 , C2.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C2.2 |
| 3 | Oral Examination | C1.2 |
| 4 | Final Term Examination | C1.1 , C1.2 , C2.1 , C2.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 8 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | weekly |
| 3 | Oral Examination | 14 |
| 4 | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 15 % |
| **2** | Semester work (Quizzes, presentation, Portfolio) | 15 % |
| **3** | Oral Examination | 10 % |
| **4** | Final Term Examination | 60 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | ***Shrikhande, M., "Earthquake Resistant Design of Structures", Prentice Hall*** Aggarwal P ***India Learning Private Limited; 3 edition, 2014.*** |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | - Introduction to earthquake engineering | 6 | C1.1 |
| 2 | - Earthquake Nature | 6 | C1.1 |
| 3 | - Earthquake hazards | 6 | C1.1 |
| 4 | - Seismic waves | 6 | C1.1 |
| 5 | - Earthquake scales | 6 | C1.1 |
| 6 | - Introduction to dynamics of structures | 6 | C1.1 |
| 7 | - solution of equation of motion of multi-degree of freedom structures | 6 | C1.1 |
| 8 | - design response spectrum for different soil types | 6 | C1.1 |
| 9 | - behavior of structures and structural elements under earthquake type loading | 6 | C2.2 |
| 10 | - Principles of earthquake resistant design of structures | 6 | C2.1 |
| 11 | – Equivalent lateral force method | 6 | C2.1 |
| 12 | - Seismic design of beams, columns and beam-column joints according to the Egyptian code. | 6 | C1.2 |

**Course Coordinator: Prof. Dr. Ahmed Mahmoud Yousef**

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**

**Date of Approval: December 2021**

| **Course: Design of earthquake resistant structures** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanices, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 apply a full range of Earthquake engineering and Dynamics of Structures concepts of Structural Analysis and Mechanices.<br><br>C1.2 Select appropriate Seismic design of beams, columns and beam-column joints according to the Egyptian code. |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of earthquake resistant design of structures.<br><br>C2.2 Achieve an optimum design of elements under earthquake type loading |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering program

**1. Basic Information**

| | |
|---|---|
| **Program Title** | Civil Engineering program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8416 |
| **Year/ Level** | Fourth Year- Second Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | |

**2. Course aims:**

| No. | aim |
|---|---|
| 6 | Design different types of projects elements to repair and strengthening them. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C5.1 | Select appropriate building materials from the perspective of strength, durability, suitability of use to repair and strengthening construction building. |
| C6.1 | Design weak construction buildings to increase its life span |

**4. Course Contents:**

| No. | To | Week |
|---|---|---|
| 1 | Causes of cracks and damage of buildings. | W1 |
| 2 | Methods of buildings investigation. | W2-W3-W4 |
| 3 | Modern and traditional methods for Rehabilitation and strengthening of buildings. | W5-W6-W7 |
| 4 | Modern and traditional materials for Rehabilitation and strengthening of buildings. | W9-W10-W11 |
| 5 | Methods of protecting and maintenance of concrete structures. | W12-W13-W14 |

## 5. Teaching and Learning Methods

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybridlearning) |
| 2 | Discussion lessons |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods 0f Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C5.1, C6.1 |
| 2 | Semester work | C5.1, C6.1 |
| 3 | Final Term Examination | C5.1, C6.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination (written) | 8 |
| 2 | Semester work (Formative - quizzes – presentation) | Weekly |
| 3 | Final Term Examination (written) | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination (written) | 20% |
| 2 | Semester work (Formative - quizzes – presentation) | 13.33% |
| 3 | Final Term Examination (written) | 66.67 % |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | A. El-Reedy, " Concrete Structures: Repair, Rehabilitation and Strengthening", 1st Edition, 2020 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | Lab Facilities |
| 3 | White Board |
| 4 | Data Show System |
| 5 | Visualizer |
| 6 | Presenter |
| 7 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Causes of cracks and damage of buildings. | 6 | C5.1 |
| 2 | Methods of buildings investigation. | 6 | C5.1 |
| 3 | Modern and traditional methods for Rehabilitation and strengthening of buildings. | 6 | C6.1 |
| 4 | Modern and traditional materials for Rehabilitation and strengthening of buildings. | 6 | C6.1 |
| 5 | Methods of protecting and maintenance of concrete structures. | 6 | C6.1 |

**Course Coordinator:** Prof. Dr. Hamed Askar

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**

**Date of Approval: December 2021**

| Course: Repair and Strengthening of Structures | |
|---|---|
| **Program LOs** | **Course LOs** |
| C5. Select appropriate building materials from the perspective of strength, durability, suitabilit of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1. Select appropriate materials from the perspective of repair and strengthening construction building. |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1. Design weak construction buildings<br>To increase its life span |

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Design of Irrigation Works II |
| **Course Code** | IRH8412 |
| **Year/ Level** | Fourth Year-First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 2 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| **6** | Design different types of projects of hydraulic control structures on waterways. |
| **7** | Use Egyptian code for water resources and irrigation works effectively and professionally to design of heading up structures. |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C1.1. | Select appropriate and sustainable technologies for the construction of heading up and water control structures. |
| C1.2. | Apply the full range of civil engineering concepts and techniques for the design of foundations of heading-up structures. |
| C6.1 | Select appropriate structures to control the water distribution in the irrigation networks of different degrees. |
| C6.2 | Design suitable structures to control water distribution in irrigation networks. |
| C7.1 | Design structures to control and protect against the dangers of unexpected natural events such as floods and storms. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| **1** | Introduction Basis and procedures for designing heading up structures. | W1 |
| **2** | Seepage theory and design of heading-up foundations. | W2 |
| **3** | Weirs: Weirs function, Types of weirs, Stability of gravity weir, Hydraulic of weirs, Static design of the floor for percolation, Uplift and scour | W3, W4 |
| **4** | Regulators and barrages: Types of regulators and component parts of the regulator, Hydraulic design of the waterway, Hydraulic and static design of piers under different cases of loading, static design of floor for percolation and scour, Gates and regulation devices: types of gates, static design of gates and winch structure. | W5, W6 |
| **5** | Locks Navigation structures: Symmetrical and unsymmetrical locks: Main elements of locks, Dimensioning of lock chamber, methods of emptying and filling the lock chamber, Hydraulic design of side culverts, hydraulic and static design of landing wall, Guide peir, Thrust wall, Floor. | W7, W9 |
| **6** | Dams, Its types, Flood routing, Gravity dams; structural design and stability, Earth, Rock-fill types, its stability, precautions, protection of slopes | W10, W12 |
| **7** | River training | W13, W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C1.2, C6.2 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C1.2, C6.1, C6.2, C9.2 |
| 3 | Oral Examination | C1.1, C6.1 |
| 4 | Final Term Examination | C1.1, C1.2, C6.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Oral Examination | **14** |
| 4 | Final Term Examination | **15** |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **20 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **13.33 %** |
| 3 | Final Term Examination | **66.66 %** |
| Total | | 100 % |

### 8. List of References

| No. | Reference List |
|---|---|
| 1 | Sharma, Er Dr S K., “Irrigation Engineering and Hydraulic Structures”, S. Chand Publishing, 2017. |
| 2 | Santosh Kumar Garg, “Irrigation Engineering and Hydraulic Structures: Water Resources Engineering, Vol. II”, Khanna Publishers Pvt. Ltd, 2016. |
| 3 | Sheng-Hong Chen " Hydraulic Structures. " Springer-Verlag Berlin Heidelberg, 2015. |
| 4 | Houghtalen, R.J., Akan, A.O.H., & Hwang, N.H.C. "Fundamentals of Hydraulic Engineering Systems" 4th edition, Prentice Hall, 2011 |

### 9. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| **1** | Introduction Basis and procedures for designing heading up structures. | 6 | C1.1 |
| **2** | Seepage theory and design of heading-up foundations. | 6 | C1.2 |
| **3** | Weirs: Weirs function, Types of weirs, Stability of gravity weir, Hydraulic of weirs, Static design of the floor for percolation, Uplift and scour | 6 | C1.1, C1.2 |
| **4** | Regulators and barrages: Types of regulators and component parts of the regulator, Hydraulic design of the waterway, Hydraulic and static design of piers under different cases of loading, static design of floor for percolation and scour, Gates and regulation devices: types of gates, static design of gates and winch structure. | 6, 7 | C6.1, C6.2 |
| **5** | Locks Navigation structures: Symmetrical and unsymmetrical locks: Main elements of locks, Dimensioning of lock chamber, methods of emptying and filling the lock chamber, Hydraulic design of side culverts, hydraulic and static design of landing wall, Guide peir, Thrust wall, Floor. | 6, 7 | C6.1, C6.2, C7.1 |

| | | | |
|---|---|---|---|
| **6** | Dams, Its types, Flood routing, Gravity dams; structural design and stability, Earth, Rock-fill types, its stability, precautions, protection of slopes | 6, 7 | C6.1, C6.2 |
| **7** | River training | 6 | C1.2 |

**Course Coordinator:** **Prof. Dr. Adel El-Masry.**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **12 /2021**

| **Course: Design of water structures 2** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1. Select appropriate and sustainable technologies for the construction of heading up and water control structures.<br><br>C1.2. Apply the full range of civil engineering concepts and techniques for the design of foundations of heading-up structures. |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 Select appropriate structures to control the water distribution in the irrigation networks of different degrees.<br><br>C6.2 Design suitable structures to control water distribution in irrigation networks. |
| C7. Design and construct structures for protection against dangers of unexpected natural events such as floods and storms. | C7.1 Design structures to control and protect against the dangers of unexpected natural events such as floods and storms. |

## 1. Basic Information

| | |
|---|---|
| **Program Tile** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Elective Course II- Water resources Eng. |
| **Course Code** | IRH8415 |
| **Year/ Level** | Fourth Year-First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of water distribution systems including, transport and distribution systems and water resources using new building materials. |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C1.1 | Select appropriate and sustainable technologies for analysis and construction of water control structures, water networks and pump stations; By applying a wide range of hydraulics concepts, and computer software. |
| C2.1 | Achieve an optimum and economic design of water distribution systems, including water networks and pumping stations. |
| C6.1 | Select adequate water control structures, water networks and pumping stations. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| **1** | Introduction & Hydrologic cycle. | W1, W2 |
| **2** | Water Resources and their development. | W3 |
| **3** | Relation between Rainfall and runoff flow. | W4, W5 |
| **4** | Hydrographs. | W6, W7 |
| **5** | Introduction in Ground water hydrology. | W9 |
| **6** | Ground water wells. | W10, W11 |
| **7** | Development of water resources in Egypt. | W12 |
| **8** | Economics of water projects. | W13, W14 |

### 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

### 6. Student Assessment:

### 6.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C6.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C1.1, C2.1, C6.1 |
| 3 | Oral Examination | C1.1, C6.1 |
| 4 | Final Term Examination | C1.1, C2.1, C6.1 |

### 6.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Oral Examination | **14** |
| 4 | Final Term Examination | **15** |

### 6.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **20 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **13.33 %** |
| 3 | Final Term Examination | **66.66 %** |
| Total | | 100 % |

### 7. List of References

| No. | Reference List |
|---|---|
| 1 | S. Masood Husain "Guidelines for Planning and Design of Piped Irrigation Networks-Part-I & II" Central Water Commission Ministry of Water Resources, River Development & Ganga Rejuvenation Government of India, 2017. |
| 2 | American Water Works Association. "Computer modeling of water distribution systems-Manual of Water Supply Practices - M32 " 3rd ed. American Water Works Association, 2012. |
| 3 | Swamee, Prabhata K., and Ashok K. Sharma. "Design of water supply pipe networks", John Wiley & Sons, 2008. |

## 8. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 9. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction & Hydrologic cycle. | 6 | C1.1 |
| 2 | Water Resources and their development. | 6 | C1.1 |
| 3 | Relation between Rainfall and runoff flow. | 6 | C1.1 |
| 4 | Hydrographs. | 6 | C1.1, C2.1, C6.1 |
| 5 | Introduction in Ground water hydrology. | 6 | C1.1, C2.1, C6.1 |
| 6 | Ground water wells. | 6 | C2.1 |
| 7 | Development of water resources in Egypt. | 6 | C1.1, C2.1, C6.1 |
| 8 | Economics of water projects. | 6 | C1.1, C2.1, C6.1 |

**Course Coordinator:** **Dr. Ahmad Mohammad Sedki Elhamrawy.**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **12 /2021**

| **Course:** Elective Course II-Water resources Eng. | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of | C1.1 Select appropriate and sustainable technologies for analysis and construction of water control structures, water networks and pump stations; By applying a wide range of hydraulics concepts, and computer software. |

| | |
|---|---|
| Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum and economic design of water distribution systems, including water networks and pumping stations. |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 Select adequate water control structures, water networks and pumping stations. |

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Elective Course II-Internal Navigation Engineering |
| **Course Code** | IRH8416 |
| **Year/ Level** | Fourth Year-First Semester |
| **Specialization** | Major |
| **Authorization dateof course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of river ports, river navigation structures and shore protections using new building materials. |
| 7 | Use the Egyptian code for marinas and river ports effectively and professionally |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C1.1 | Select appropriate and sustainable technologies for construction and maintenance of inland navigation structures applying a full range of civil engineering concepts and techniques of: structural analysis, properties and strength of materials, soil mechanics, hydrology and hydraulics. |
| C2.1 | Achieve an optimum design of inland navigation structures projects. |
| C4.1 | Use the Egyptian code for marinas and river ports effectively and professionally. |
| C5.1 | Select appropriate building materials for the construction of inland port elements and shore protections in terms of strength, durability, suitability of use for location, temperature, weather conditions, water effects and the environment. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | Introduction | W1 |
| **2** | Inland Navigation economics | W2 |
| **3** | Design and hydraulic of Inland navigation | W3, W4 |
| **4** | Navigation Aids | W5 |
| **5** | Hydrodynamics of ship movements | W6 |
| **6** | Development of navigation channels and its stability | W7 |
| **7** | Planning and design of river harbors | W9, W10 |

| | | |
|---|---|---|
| **8** | Design of navigation Locks | W11, W12 |
| **9** | Evaluate of environmental effect | W13, W14 |

**5. Teaching and Learning Methods:**

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

**6. Student Assessment:**

**6.1 Student Assessment Methods:**

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C4.1, C5.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C1.1, C2.1, C4.1, C5.1 |
| 3 | Final Term Examination | C1.1, C2.1, C4.1, C5.1 |

**6.2 Assessment Schedule:**

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Final Term Examination | **15** |

**6.3 Weighting of Assessments:**

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **20 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **13.33 %** |
| 3 | Final Term Examination | **66.66 %** |
| Total | | 100 % |

**7. List of References**

| No. | Reference List |
|---|---|
| 1 | Galieriková, A., & Sosedová, J. “Environmental aspects of transport in the context of development of inland navigation” Ekológia, 35(3), 279, 2016. |
| 2 | McCartney, B., et al. "Inland navigation channel training works" American Society of Civil Engineers, 2012. |
| 3 | Beelen, M. “Structuring and modelling decision making in the inland navigation sector” Universiteit Antwerpen (Belgium), 2011. |

## 8. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 9. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction | 6 | C1.1 |
| 2 | Inland Navigation economics | 6 | C1.1 |
| 3 | Design and hydraulic of Inland navigation | 6 | C1.1 |
| 4 | Navigation Aids | 6, 7 | C1.1, C2.1, C4.1, C5.1 |
| 5 | Hydrodynamics of ship movements | 6, 7 | C1.1, C2.1, C4.1, C5.1 |
| 6 | Development of navigation channels and its stability | 6, 7 | C1.1, C2.1, C4.1, C5.1 |
| 7 | Planning and design of river harbors | 6, 7 | C1.1, C2.1, C4.1, C5.1 |
| 8 | Design of navigation Locks | 6 | C1.1 |
| 9 | Evaluate of environmental effect | 4 | C1.1 |

**Course Coordinator:** **Dr. Reda Mahmoud Diab.**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **/ /2021.**

| **Course:** Elective Course II- Inland Navigation Engineering | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 Select appropriate and sustainable technologies for construction and maintenance of inland navigation structures applying a full range of civil engineering concepts and techniques of: structural analysis, properties and strength of materials, soil mechanics, hydrology and hydraulics. |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of inland navigation structures projects. |
| C4. Use the codes of practice of all civil engineering disciplines effectively and professionally. | C4.1 Use the Egyptian code for marinas and river ports effectively and professionally. |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1 Select appropriate building materials for the construction of inland port elements and shore protections in terms of strength, durability, suitability of use for location, temperature, weather conditions, water effects and the environment. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Works Engineering Department |
| **Course Code** | PWE 8413 |
| **Year/ Level** | Fourth Year-First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 2 | |

## 2. Course aims:

| No. | Aim |
|---|---|
| 1 | Design different types of Highway projects such as flexible and rigid pavement using suitable techniques. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | Select appropriate technologies for construction pavements. |
| C1.2 | Apply a full range of techniques for material selection and design. |
| C2.1 | Achieve an optimum design of Roadways and Airports |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Introduction | 1 |
| 2 | Subgrade, base and subbase material characterization | 2 |
| 3 | Bituminous materials characterization. | 3 |
| 4 | Hot-Mix-Asphalt design and testing | 4 |
| 5 | Hot-Mix-Asphalt production & construction | 5 |
| 6 | Thickness design of flexible and rigid pavements | 6 |
| 7 | Introduction to geometric design | 7 |
| 8 | Sight distance. | 9 |
| 9 | Horizontal alignment | 10 |
| 10 | Vertical alignment | 11 |
| 11 | At-grade intersections | 12 |
| 12 | Introduction to airport engineering, airport site selection and layout | 13 |
| 13 | Wind rose, runways, taxiways, and apron area | 14 |

| | | |
|---|---|---|
| 14 | Landing in asphalt & the effect of rainwater (Gap analysis) | 14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term examination | C1.2 |
| **2** | Semester work | C1.2 |
| **3** | Final Term examination | C1.1, C1.2, C2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term examination | 8 |
| **2** | Semester work | weekly |
| **3** | Final Term examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term examination | 13.33% |
| **2** | Semester work | 10% |
| **3** | Final Term examination | 66.67% |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | E. Ray and Prithvi S. Kandhal and Freddy L. Roberts and Y. Richard Kim and Dah-Yinn Lee and Thomas W. Kennedy Brown, "Hot Mix Asphalt Materials, Mixture Design, and Construction", NCAT, 3rd edition, 2009. |
| 2 | Athanassios Nikolaides, "Highway Engineering pavement, Materials and Control of Quality", 2017. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction | 6 | C1.1 |
| 2 | Subgrade, base and subbase material characterization | 6 | C1.2 |
| 3 | Bituminous materials characterization. | 6 | C1.2 |
| 4 | Hot-Mix-Asphalt design and testing | 6 | C1.2 |
| 5 | Hot-Mix-Asphalt production & construction | 6 | C2.1 |
| 6 | Thickness design of flexible and rigid pavements | 6 | C2.1 |
| 7 | Introduction to geometric design | 6 | C2.1 |
| 8 | Sight distance. | 6 | C1.2 |
| 9 | Horizontal alignment | 6 | C1.1, C1.2 |
| 10 | Vertical alignment | 6 | C1.1, C1.2 |
| 11 | At-grade intersections | 6 | C1.1, C1.2 |
| 12 | Introduction to airport engineering, airport site selection and layout | 6 | C2.1 |

| | | | |
|---|---|---|---|
| 13 | Wind rose, runways, taxiways, and apron area | 6 | C2.1 |
| 14 | Landing in asphalt & the effect of rainwater (Gap analysis) | 6 | C2.1 |

**Course Coordinator:**

1. Sherief Masoud Ahmed El Badwy

2. Ahmed Mohamed Metwally Awad

**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Roads & Airports | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 Select appropriate technologies for construction pavements.<br><br>C1.2 Apply a full range of techniques for material selection and design. |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of Roadways and Airports |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Work Engineering department |
| **Course Code** | PWE8415-4 |
| **Year/ Level** | Fourth year |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of Wastewater projects like Wastewater treatment plant units and sewage network. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C2.1 | Achieve an optimum design of wastewater treatment plant components |
| C2.2 | Achieve an optimum design of sewage network |
| C6.1 | design adequate sewerage systems |
| C6.2 | design pump stations and force main sewage |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Introduction, Preliminary studies. | 1 |
| 2 | Characteristics of Wastewater. | 1 |
| 3 | Water quality management | 2 |
| 4 | Wastewater Systems | 3 |
| 5 | Conventional wastewater collection and treatment systems | 4 |
| 6 | New technologies for wastewater collection and treatment | 5 |
| 7 | Low cost technologies for wastewater collection and treatment | 7 |
| 8 | Small bore sewer system for wastewater collection | 7 |
| 9 | On-site wastewater treatment for rural areas | 9 |
| 10 | Wastewater treatment using stabilization ponds. | 10 |
| 11 | Wastewater treatment using aerated lagoons. | 11 |
| 12 | Wastewater treatment using extended aeration activated sludge | 12 |

| | | |
|---|---|---|
| 13 | Wastewater treatment using wetland. | 13 |
| 14 | Cost analysis for the alternatives of wastewater collection and treatment | 14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination | C1.1 , C1.2 |
| **2** | Semester work | C6.1 |
| **3** | Final Term Examination | C1.1 , C1.2 , C6.1 , C6.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination | 8 |
| **2** | Semester work | weekly |
| **3** | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 20 % |
| **2** | Semester work | 13 % |
| **3** | Final Term Examination | 67 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | ***Ronald L. Droste, Ronald L. Gehr., "Theory and Practice of Water and Wastewater Treatment," 2nd Edition, WILEY, 2018.*** |

| | |
|---|---|
| **2** | ***Metcalf & Eddy, " Wastewater Engineering (Treatment, Disposal& Reuse)", Fourth Edition, Mc Graw-Hill Book Co., 2003.*** |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

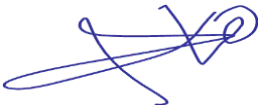
| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction, Preliminary studies. | 6 | C2.1 |
| 2 | Characteristics of Wastewater. | 6 | C2.2 |
| 3 | Water quality management | 6 | C2.1 , C2.2 |
| 4 | Wastewater Systems | 6 | C2.1 , C2.2 |
| 5 | Conventional wastewater collection and treatment systems | 6 | C2.1 , C6.1 |
| 6 | New technologies for wastewater collection and treatment | 6 | C2.1 , C6.2 |
| 7 | Low cost technologies for wastewater collection and treatment | 6 | C2.2 , C6.1 |
| 8 | Small bore sewer system for wastewater collection | 6 | C2.2 , C6.2 |
| 9 | On-site wastewater treatment for rural areas | 6 | C6.1 |
| 10 | Wastewater treatment using stabilization ponds. | 6 | C6.2 |
| 11 | Wastewater treatment using aerated lagoons. | 6 | C6.1 , C6.2 |
| 12 | Wastewater treatment using extended aeration activated sludge | 6 | C6.1 , C6.2 |
| 13 | Wastewater treatment using wetland. | 6 | C2.1 , C6.1 , C6.2 |

| | | | |
|---|---|---|---|
| 14 | Cost analysis for the alternatives of wastewater collection and treatment | 6 | C2.2 , C6.1 , C6.2 |

**Course Coordinator:**

1. Mohamed Ahmed Abd El Hakim Mosaad

2. Hani Mahanna Shehata El Said



**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Modern Economical Techniques in Wastewater collection and treatment | |
|---|---|
| **Program LOs** | **Course LOs** |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of wastewater treatment plant components<br><br>C2.2 Achieve an optimum design of sewage network |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 design adequate sewerage systems<br><br>C6.2 design pump stations and force main sewage |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Work Engineering department |
| **Course Code** | PWE8416 |
| **Year/ Level** | Fourth year |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of drinking water projects like drinking water treatment plant units, elevated tanks and drinking water network. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C2.1 | Achieve an optimum design of drinking water treatment plant units. |
| C2.2 | Achieve an optimum design of water network system. |
| C6.1 | Select adequate water network system. |
| C6.2 | Design water network components. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Introduction, Pre-design Studies of Water Supply Systems | 1 |
| 2 | Surface Water Collection Works | 2 - 3 |
| 3 | Coagulation | 4 |
| 4 | nonclassical Sedimentation | 5 - 6 |
| 5 | Advenced Filtration | 7 |
| 6 | Disinfection and water storage tanks | 9 |
| 7 | Specifications of potable water and classical methods of water purification | 10 - 11 |
| 8 | modern water purification techniques | 12 |
| 9 | comparative study between classical and modern methods with respect to economy and efficiency | 13 - 14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination | C2.1 , C2.2 |
| **2** | Semester work | C6.1 |
| **3** | Final Term Examination | C2.1 , C2.2 , C6.1 , C6.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination | 8 |
| **2** | Semester work | weekly |
| **3** | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 20 % |
| **2** | Semester work | 13.33 % |
| **3** | Final Term Examination | 66.67 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | ***Ronald L. Droste, Ronald L. Gehr., "Theory and Practice of Water and Wastewater Treatment," 2nd Edition, WILEY, 2018.*** |
| **2** | ***Qasim S.R., Motley E. M. and Zhu G., "Water Works Engineering: Planning, Design & Operation," A hand book, Eastern Economy Edition, 2004.*** |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction, Pre-design Studies of Water Supply Systems | 6 | C2.1 |
| 2 | Surface Water Collection Works | 6 | C2.2 |
| 3 | Coagulation | 6 | C2.1 , C2.2 |
| 4 | nonclassical Sedimentation | 6 | C2.1 , C2.2 |
| 5 | Advenced Filtration | 6 | C2.1 ,C6.1 |
| 6 | Disinfection and water storage tanks | 6 | C2.2 , C6.2 |
| 7 | Specifications of potable water and classical methods of water purification | 6 | C6.1 |
| 8 | modern water purification techniques | 6 | C6.2 |
| 9 | comparative study between classical and modern methods with respect to economy and efficiency | 6 | C6.1 , C6.2 |

**Course Coordinator:**

Mohamed Ahmed Abd El Hakim Mosaad

Hani Mahanna Shehata El Said

**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Drinking Water Engineering | |
|---|---|
| **Program LOs** | **Course LOs** |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of drinking water treatment plant units.<br><br>C2.2 Achieve an optimum design of water network system. |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 Select adequate water network system.<br><br>C6.2 Design water network components. |

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Elective Course III- Design of Coastal Protection Works |
| **Course Code** | IRH8425 |
| **Year/ Level** | Fourth Year-Second Semester |
| **Specialization** | Major |
| **Authorization date of course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of coastal protection systems, using satellite images and remote sensing in the monitoring of erosion and accretion on the beaches, considering the impact of climate change. |
| 7 | Use the Egyptian code for water resources and irrigation works effectively and professionally. |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C2.1 | Achieve an optimum design of coastal protection structures including breakwaters, seawalls, jetties and groins, in conjunction with remote intelligent sensors and satellite imagery. |
| C4.1 | Use the Egyptian code for water resources and irrigation works (Volume VII: Techniques for seashore protection) effectively and professionally. |
| C5.1 | Select appropriate building materials of the coastal structures, concerning the environmental factors in coastal areas studies and their impact on development plans. |
| C7.1 | Design coastal structures to control and protect against the dangers of climate change and unexpected natural events such as storms like Tsunami. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| **1** | Introduction to coastal structures | W1, W2 |
| **2** | Coastal areas hydrodynamics | W3, W4 |
| **3** | Sediment Transport | W5, W6 |
| **4** | Shoreline Morphology | W7, W9 |
| **5** | Erosion of shoreline | W10 |
| **6** | Shore Protection Works Design | W11 |
| **7** | Shore Protection Nourishment Design | W12 |

| | | |
|---|---|---|
| **8** | Methods and Construction Materials | W13 |
| **9** | Environmental Impact Evaluation | W14 |

**5. Teaching and Learning Methods:**

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

**6. Student Assessment:**

**6.1 Student Assessment Methods:**

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C2.1, C5.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C2.1, C4.1, C5.1, C7.1 |
| 3 | Final Term Examination | C2.1, C4.1, C5.1, C7.1 |

**6.2 Assessment Schedule:**

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Final Term Examination | **15** |

**6.3 Weighting of Assessments:**

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **20 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **13.33 %** |
| 3 | Final Term Examination | **66.66 %** |
| Total | | 100 % |

**7. List of References**

| No. | Reference List |
|---|---|
| 1 | Reeve, D., Chadwick, A., and Fleming, C., "Coastal engineering: processes, theory and design practice" 3rd ed., CRC Press, 2018. |
| 2 | Ahlhorn, F. "Integrated coastal zone management: Status, challenges and prospects" Springer, 2017. |

**8. Facilities Required for Teaching and Learning:**

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |

| | |
|---|---|
| 5 | Presenter |
| 6 | Sound System |

## 9. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to coastal structures | 6 | C2.1 |
| 2 | Coastal areas hydrodynamics | 6 | C2.1 |
| 3 | Sediment Transport | 6 | C2.1, C4.1, C5.1 |
| 4 | Shoreline Morphology | 6 | C2.1 |
| 5 | Erosion of shoreline | 6 | C2.1, C4.1, C5.1, C7.1 |
| 6 | Shore Protection Works Design | 6 | C5.1 |
| 7 | Shore Protection Nourishment Design | 6 | C7.1 |
| 8 | Methods and Construction Materials | 6 | C2.1, C5.1 |
| 9 | Environmental Impact Evaluation | 6 | C2.1, C5.1 |

**Course Coordinator:** **Dr. Kareem Adel Nassar.**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **12 / 2021**

**Course: Elective Course II- Design of Coastal Protection Works**

| Program LOs | Course LOs |
|---|---|
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of coastal protection structures including breakwaters, seawalls, jetties and groins, in conjunction with remote intelligent sensors and satellite imagery. |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1 Select appropriate building materials of the coastal structures, concerning the environmental factors in coastal areas studies and their impact on development plans. |
| C7. Design and construct structures for protection against dangers of unexpected natural events such as floods and storms. | C7.1 Design coastal structures to control and protect against the dangers of climate change and unexpected natural events such as storms like Tsunami. |

## 1. Basic Information

| | |
|---|---|
| **Program Tile** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Elective Course III-Design of mega irrigation structures |
| **Course Code** | IRH8425 |
| **Year/ Level** | Fourth Year-Second Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| **6** | Design different types of mega irrigation structures such as spillwayand dams and reservoirs using new building materials for protection against dangers of unexpected natural events such as floods and storms |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C1.1 | Select appropriate and sustainable technologies for the construction of dams and spillway. |
| C1.2 | Apply the full range of civil engineering concepts and techniques for the design of different types of dams. |
| C5.1 | Select the appropriate building materials for spillway and dam construction from the perspective of strength, durability, suitability of use for site, temperature, weather conditions, and various environmental influences. |
| C7.1 | Design structures to control and protect against the dangers of unexpected natural events such as floods and storms. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | Introduction | W1 |
| **2** | Spilway structure | W2, W3, W4, W5 |
| **3** | Dam cover | W6, W7, W8, W9 |
| **4** | Dewatering systems | W10, W11, W12, W13, W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|

| | |
|---|---|
| **1** | Lectures |
| **2** | Discussion Sessions |

**5. Teaching and Learning Methods:**

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

**6. Student Assessment:**

**6.1 Student Assessment Methods:**

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C1.2, C5.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C1.1, C1.2, C5.1, C7.1 |
| 3 | Final Term Examination | C1.1, C1.2, C5.1, C7.1 |

**6.2 Assessment Schedule:**

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Final Term Examination | **15** |

**6.3 Weighting of Assessments:**

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **20 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **13.33 %** |
| 3 | Final Term Examination | **66.66 %** |
| Total | | 100 % |

**7. List of References**

| No. | Reference List |
|---|---|
| 1 | Anil K. Chopra "Earthquake Engineering for Concrete Dams: Analysis, Design, and Evaluation" JohnWiley & Sons Ltd, 2020 |
| 2 | Ljubomir Tanchev "Dams and Appurtenant Hydraulic Structures" 2nd edition, Taylor & Francis Group, London, UK, 2014. |
| 3 | Barry Lewis “Small Dams: Planning, Construction and Maintenance” Taylor & Francis Group, London, UK, 2013 |

**8. Facilities Required for Teaching and Learning:**

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |

| | |
|---|---|
| 6 | Sound System |

**9. Matrix of Knowledge and Skills of the Course:**

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction | 6 | C5.1 |
| 2 | Spilway structure | 6 | C1.2, C5.1, C7.1 |
| 3 | Dam cover | 6 | C1.2, C7.1 |
| 4 | Dewatering systems | 6 | C1.1, C7.1 |

**Course Coordinator:** **Dr. Reda Diab**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **12 / 2021.**

**Course Specifications:** Elective Course III

| Program LOs | Course LOs |
|---|---|
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1. Select appropriate and sustainable technologies for the construction of dams and spillway.<br><br>C1.2. Apply the full range of civil engineering concepts and techniques for the design of different types of dams |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions, and impacts of seawater and the environment. | C5.1. Select the appropriate building materials for spillway and dam construction from the perspective of strength, durability, suitability of use for site, temperature, weather conditions, and various environmental influences. |
| C7. Design and construct structures for protection against dangers of unexpected natural events such as floods and storms. | C7.1 Design structures to control and protect against the dangers of unexpected natural events such as floods and storms. |

## 1. Basic Information

| | |
|---|---|
| **Program Tile** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Elective Course III- **Design of the advanced irrigation systems** |
| **Course Code** | IRH8425 |
| **Year/ Level** | Fourth Year-First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 2 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| **6** | Design different types of advanced irrigation systems projects using new building materials. |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C1.1 | Select appropriate and sustainable technologies for construction of water structures and water networks; by applying a full range of civil engineering concepts and techniques in the field of Hydrology and Hydraulics. |
| C5.1 | Select suitable components of the irrigation network from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and withstand operational water pressures |
| C6.1 | Select the appropriate irrigation network system according to soil, topography and climate of the agricultural area. |
| C6.2 | Design a suitable water network for the modern irrigation systems. |

## 4. Course Contents:

| No. | Topics | Week |
|---|---|---|
| **1** | Introduction | W1, W2 |
| **2** | Sprinkler irrigation system | W3, W4, W5, W6 |
| **3** | Emitter irrigation system | W7, W8, W9, W10 |
| **4** | Design of the developed Mesqa | W11, W12, W13, W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | lectures |

| | |
|---|---|
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Student Assessment:

### 6.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C5.1, C6.1, C6.2 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C1.1, C5.1, C6.1, C6.2 |
| 3 | Oral Examination | C5.1, C6.1 |
| 4 | Final Term Examination | C1.1, C5.1, C6.1, C6.2 |

### 6.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Oral Examination | **14** |
| 4 | Final Term Examination | **15** |

### 6.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **20 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **13.33 %** |
| 3 | Final Term Examination | **66.66 %** |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | Omran, El-Sayed E., and Abdelazim M. Negm, eds. "Technological and Modern Irrigation Environment in Egypt: Best Management Practices & Evaluation." Springer Nature, 2020. |
| 2 | Megh R. Goyal, and P. Panigrahi, "Sustainable Micro Irrigation Design Systems for Agricultural Crops: Methods and Practices" CRC Press, Taylor & Francis Group, 2016. |
| 3 | Biswas, Ranajit Kumar. "Drip and Sprinkler Irrigation." New Delhi, New India Publishing Agency, 2015. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 9. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction | 6 | C1.1 |
| 2 | Sprinkler irrigation system | 6 | C1.1, C5.1, C6.1, C6.2 |
| 3 | Emitter irrigation system | 6 | C1.1, C5.1, C6.1, C6.2 |
| 4 | Design of the developed Mesqa | 6 | C1.1, C5.1 |

**Course Coordinator:** **Dr. Ahmad Mohammad Sedki Elhamrawy.**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **12 /2021**

| **Course:** Elective Course III | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 Select appropriate and sustainable technologies for construction of water structures and water networks; by applying a full range of civil engineering concepts and techniques in the field of Hydrology and Hydraulics. |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1 Select suitable components of the irrigation network from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and withstand operational water pressures |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 Select the appropriate irrigation network system according to soil, topography and climate of the agricultural area.<br>C6.2 Design a suitable water network for the modern irrigation systems. |

## 1. Basic Information

| | |
|---|---|
| **Program Tile** | Civil Engineering |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Irrigation and Hydraulics Engineering |
| **Course Name** | Harbors Engineering |
| **Course Code** | IRH8423 |
| **Year/ Level** | Fourth Year-Second Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | 12/2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 2 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of ports, marinas, and shore protections using new building materials. |

## 3. Learning Outcomes (LOs):

| No. | LOs |
|---|---|
| C1.1 | Select appropriate and sustainable technologies for construction of harbor structures marinas, breakwaters and shore protections applying a full range of civil engineering concepts and techniques of: structural analysis, properties and strength of materials, soil mechanics, hydrology and hydraulics. |
| C2.1 | Achieve an optimum design of harbor components including breakwaters, navigation channels, quay walls, and berths. |
| C5.1 | Select appropriate building materials of the harbor components considering the impact of seawater and environment. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| **1** | Introduction to coastal hydrodynamics :Wind, Tides, Currents, Wave Theory ,Linear and Non-Linear Theories of Regular Gravity Waves | W1 |
| **2** | Wave Properties and Transformation in Shoaling Waters, Wave Action on Walls and Piles, , Wave Forces on Structures | W2 |
| **3** | Coastal sediment and morphology .Ship characteristics and their influence on port management and operations .Sedimentation and erosion problems in harbors | W3, W4 |
| **4** | Types of Ports, Site Selection, Port Planning, location and orientation of major port components | W5, W6 |
| **5** | Breakwaters : types ,design and construction methods | W7, W8, W9 |
| **6** | Berthing structures : types, load action , design and construction | W10, W11, W12 |

| | | |
|---|---|---|
| **7** | Marin structures | W13, W14 |

**5. Teaching and Learning Methods:**

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

**6. Teaching and Learning Methods for Disable Students:**

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

**7. Student Assessment:**

**7.1 Student Assessment Methods:**

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C5.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C1.1, C2.1, C5.1 |
| 3 | Oral Examination | C1.1, C5.1 |
| 4 | Final Term Examination | C1.1, C2.1, C5.1 |

**7.2 Assessment Schedule:**

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | **8** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **weekly** |
| 3 | Oral Examination | **14** |
| 4 | Final Term Examination | **15** |

**7.3 Weighting of Assessments:**

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | **15 %** |
| 2 | Semester work (Quizzes, presentation, Portfolio) | **15 %** |
| 3 | Final Term Examination | **70 %** |
| Total | | 100 % |

**8. List of References**

| No. | Reference List |
|---|---|
| 1 | J. William Kamphuis. "Advanced Series on Ocean Engineering: Volume 48 - Introduction to Coastal Engineering and Management (3rd Edition)". ISBN: 978-981-120-799-0, World scientific, 2020 |
| 2 | Us Army Corps of Engineers. "Coastal Engineering Manual". EM1110-2-1100. US Army Coastal Research Center, 2008. |

| | |
|---|---|
| 3 | Tsinker, Gregory P., ed. "Port engineering: planning, construction, maintenance, and security", John Wiley & Sons, 2004. |

**9. Facilities Required for Teaching and Learning:**

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

**9. Matrix of Knowledge and Skills of the Course:**

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction to coastal hydrodynamics :Wind, Tides, Currents, Wave Theory ,Linear and Non-Linear Theories of Regular Gravity Waves | 6 | C1.1 |
| 2 | Wave Properties and Transformation in Shoaling Waters, Wave Action on Walls and Piles, , Wave Forces on Structures | 6 | C1.1 |
| 3 | Coastal sediment and morphology .Ship characteristics and their influence on port management and operations .Sedimentation and erosion problems in harbors | 6 | C1.1 |
| 4 | Types of Ports, Site Selection, Port Planning, location and orientation of major port components | 6 | C1.1 |
| 5 | Breakwaters : types ,design and construction methods | 6 | C1.1, C2.1, C5.1 |
| 6 | Berthing structures : types, load action , design and construction | 6 | C1.1, C2.1, C5.1 |
| 7 | Marin structures | 6 | C1.1, C2.1, C5.1 |

**Course Coordinator:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Head of Department:** **Assoc. Prof. Dr. Tharwat Eid Sarhan.**

**Date of Approval:** **12/ 2021**

| **Course: Harbors Engineering** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1 Select appropriate and sustainable technologies for construction of harbor structures marinas, breakwaters and shore protections applying a full range of civil engineering concepts and techniques of: structural analysis, properties and strength of materials, soil mechanics, hydrology and hydraulics. |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of harbor components including breakwaters, navigation channels, quay walls, and berths. |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1 Select appropriate building materials of the harbor components considering the impact of seawater and environment. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Works Engineering department |
| **Course Code** | PWE 8424 |
| **Year/ Level** | Fourth Year-Second Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 2 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6.1 | Design different types of drinking water projects like drinking water treatment plant units, elevated tanks and drinking water network. |
| 6.2 | Design different types of Wastewater projects like Wastewater treatment plant units and sewage network. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C2.1 | Achieve an optimum design of drinking water treatment plant units. |
| C2.2 | Achieve an optimum design of water network system. |
| C2.3 | Achieve an optimum design of wastewater treatment plant components |
| C2.4 | Achieve an optimum design of sewage network |
| C6.1 | Select adequate water network system. |
| C6.2 | Design water network components. |
| C6.3 | design adequate sewerage systems |
| C6.4 | design pump stations and force main sewage |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Introduction, Pre-design Studies of Water Supply Systems | 1 |
| 2 | Surface Water Collection Works | 2 |
| 3 | Coagulation | 3 |
| 4 | Sedimentation | 4 |

| | | |
|---|---|---|
| 5 | Filtration | 5 |
| 6 | Disinfection and water storage tanks | 6 |
| 7 | Distribution networks | 7 |
| 8 | Introduction, Pre-design Studies of wastewater Collection and Treatment | 9 |
| 9 | Sewerage Systems and Pumping Stations. (Gap analysis) | 10 |
| 10 | Wastewater Primary Treatment | 11 |
| 11 | Wastewater Biological Treatment | 12 |
| 12 | Sludge Disposal (self-study) | 13-14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination | C2.1, C2.2 ,C6.1,C6.2 |
| **2** | Semester work ( Quizzes ) | C2.2, C2.4 , C6.2 , C6.4 |
| **3** | Final Term Examination | C2.1 , C2.2 , C2.3 , C2.4 , C6.1 , C6.2 , C6.3 , C6.4 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination | 8 |
| **2** | Semester work ( Quizzes ) | weekly |
| **3** | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 16 % |
| **2** | Semester work ( Quizzes ) | 12 % |
| **3** | Final Term Examination | 72 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | ***Ronald L. Droste, Ronald L. Gehr., "Theory and Practice of Water and Wastewater Treatment," 2nd Edition, WILEY, 2018.*** |
| 2 | ***Qasim S.R., Motley E. M. and Zhu G., "Water Works Engineering: Planning, Design & Operation," A hand book, Eastern Economy Edition, 2004.*** |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Introduction, Pre-design Studies of Water Supply Systems | 6.1 | C2.1 |
| 2 | Surface Water Collection Works | 6.1 | C2.1 , C2.2 |
| 3 | Coagulation | 6.1 | C2.2 |
| 4 | Sedimentation | 6.1 | C2.2 |
| 5 | Filtration | 6.1 | C2.2 |
| 6 | Disinfection and water storage tanks | 6.1 | C6.1 , C6.2 |
| 7 | Distribution networks | 6.1 | C6.1 , C6.2 |
| 8 | Introduction, Pre-design Studies of wastewater Collection and Treatment | 6.2 | C2.3 , C2.4 |
| 9 | Sewerage Systems and Pumping Stations. (Gap analysis) | 6.2 | C2.3 , C2.4 |
| 10 | Wastewater Primary Treatment | 6.2 | C6.3 , C6.4 |
| 11 | Wastewater Biological Treatment | 6.2 | C6.3 , C6.4 |
| 12 | Sludge Disposal (self-study) | 6.2 | C6.3 , C6.4 |

**Course Coordinator:**

1. Mohamed Ahmed Abd El Hakim Mosaad
2. Hani Mahanna Shehata El Said

**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Drinking Water Engineering | |
|---|---|
| **Program LOs** | **Course LOs** |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of drinking water treatment plant units.<br><br>C2.2 Achieve an optimum design of water network system.<br><br>C2.3 Achieve an optimum design of wastewater treatment plant components<br><br>C2.4 Achieve an optimum design of sewage network |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1 Select adequate water network system.<br><br>C6.2 Design water network components.<br><br>C6.3 Design adequate sewerage systems<br><br>C6.4 Design pump stations and force main sewage |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department +Irrigation and Hydraulics Engineering Department |
| **Department Responsible for the Course** | Public Work Engineering department |
| **Course Code** | PWE8425-4 |
| **Year/ Level** | Fourth Year |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | 0 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design transportation systems using geographical distribution and disciplines of air Transportation . |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C2.1 | Achieve an optimum design of air transportation systems considering Nature and importance of air transportation . |
| C2.2 | Design air transportation systems considering geographical distribution and the degree of competition . |
| C3.1 | Maintain safety measures in air transportation systems considering air transport history . |
| C3.2 | Plan the development of air transport by the analytical descriptive methods in tracing |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Fundamentals of Air Transportation. | 1-2 |
| 2 | Nature and importance of air transportation systems. | 3-4 |
| 3 | Study the geographical distribution of air transport. | 5-7 |
| 4 | Study the degree of competition of the air transport faces. | 9-10 |
| 5 | Study the historical face of air transport. | 11-12 |
| 6 | Study the analytical descriptive methods in tracing the development of air transport. | 12-14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| **1** | Mid Term Examination | C2.2 , C3.1 |
| **2** | Semester work ( Quizzes ) | C2.1 |
| **3** | Final Term Examination | C2.1 , C2.2 , C3.1 , C3.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| **1** | Mid Term Examination | 8 |
| **2** | Semester work ( Quizzes ) | Weekly |
| **3** | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| **1** | Mid Term Examination | 13.33 % |
| **2** | Semester work ( Quizzes ) | 20 % |
| **3** | Final Term Examination | 66.67 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Lucy Budd, Stephen Ison. "Air Transport Management: An international perspective". Routledge, 2016 |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Fundamentals of Air Transportation. | 6 | C2.1 |
| 2 | Nature and importance of air transportation systems. | 6 | C2.1 |
| 3 | Study the geographical distribution of air transport. | 6 | C2.2 |
| 4 | Study the degree of competition of the air transport faces. | 6 | C2.2 |
| 5 | Study the historical face of air transport. | 6 | C3.1 |
| 6 | Study the analytical descriptive methods in tracing the development of air transport. | 6 | C3.2 |

**Course Coordinator:**

Usama Elrawy Ali Shahdah 

**Head of Department: Prof. Dr. Muharram Fouad Abdo Allaa El Din**

**Date of Approval: December 2021**

| Course: Air Transportation Systems | |
|---|---|
| **Program LOs** | **Course LOs** |
| **C2.** Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors | C2.1 Achieve an optimum design of air transportation systems considering Nature and importance of air transportation .<br><br>C2.2 Design air transportation systems considering geographical distribution and the degree of competition. |
| **C3.** Plan and manage construction processes; address construction defects, instability, and quality issues; maintain safety measures in construction and materials | C3.1 Maintain safety measures in air transportation systems considering air transport history .<br><br>C3.2 Plan the development of air transport by the analytical descriptive methods in tracing. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Course Code** | STE + PWE + IRH 8426 |
| **Year/ Level** | Fourth year - First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | - | - | 5 |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design different types of projects in different fields within structural engineering field, using new building materials and software. |
| 7 | Use the Egyptian codes of practice of all civil engineering fields effectively and Professionally according to the graduation project kind. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures |
| C1.2 | Apply a full range of civil engineering concepts and techniques |
| C2.1 | Achieve an optimum design |
| C3.1 | Plan and manage construction processes |
| C3.2 | Maintain safety measures in construction and materials |
| C4.1 | Use the codes of practice of all civil engineering disciplines |
| C5.1 | Select appropriate building materials in the project |
| C6.1 | Design an adequate project. |
| C7.1 | Design structures to withstand un natural events |

## 4. Course Contents:

| No. | T | week |
|---|---|---|
| 1 | Data processing and analysis | W1, W2, W3, W4 |
| 2 | Main professional and practical part | W5, W6, W7 |
| 3 | Conclusions and recommendations | W9, W10, W11 |
| 4 | Writing the project document | W12, W13, W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Semester work | C1.1, C1.2, C3.1, C4.1 |
| 2 | Discussion | C5.1, C6.1, C8.1, C7.1, C10.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Semester work | Weekly |
| 2 | Discussion | 15th week |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Semester work | 33% |
| 2 | Discussion | 67% |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | ***According to the project subject*** |

## 9. Facilities Required for Teaching and Learning

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |
| 7 | Laboratory |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| | Data processing and analysis | 6 | C1.1, C1.2, C3.1 |
| | Main professional and practical part | 6 | C4.1, C5.1, C7.1 |
| | Conclusions and recommendations | 7 | C7.1, C6.1 |
| | Writing the project document | 7 | C6.1, C7.1 |

**Course Coordinator:** ***According to the project subject***

**Head of Department:** ***According to the project discipline***

**Date of Approval: December 2021**

| **Course: Graduation Project** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics | C1.1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures<br><br>C1.2. Apply a full range of civil engineering concepts and techniques |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1. Achieve an optimum design |
| C3. Plan and manage construction processes; address construction defects, instability, and quality issues; maintain safety measures in construction and materials. | C3.1. Plan and manage construction processes<br>C3.2. Maintain safety measures in construction and materials |
| C4. Use the codes of practice of all civil engineering disciplines effectively and Professionally. | C4.1. Use the codes of practice of all civil engineering disciplines |
| C5. Select appropriate building materials from the perspective of strength, durability, suitability of use to location, temperature, weather conditions and impacts of seawater and environment. | C5.1. Select appropriate building materials in the project |
| C6. Select and design adequate water control structures, irrigation and water networks, sewerage systems and pumping stations. | C6.1. Design an adequate project. |
| C7. Design and construct structures for protection against dangers of unexpected natural events such as floods and storms | C7.1. Design structures to withstand un natural events |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8421 |
| **Year/ Level** | Fourth Year- Second Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 2 | |

## 2. Course aims:

| No. | Aim |
|---|---|
| 7 | Use the codes of practice of structural engineering disciplines effectively and Professionally |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C2.1 | Achieve an optimum design of Reinforced Concrete Water Structures. |
| C2.2 | Design Special Structures such as Prestressed members , Surface of Revolution. |
| C4.1 | Use the codes of practice in Serviceability limit states and Lateral Load Design. |

## 4. Course Contents:

| No. | T | week |
|---|---|---|
| 1 | Design of concrete structures for serviceability. | W1, W2, W3 |
| 2 | Design of water structures (swimming pools, rectangular tanks, circular tanks). | W4, W5, W6 |
| 3 | Design of surface of revolution structures. | W7 |
| 4 | Design of pre-stressed concrete structures. | W9, W10, W11 |
| 5 | Design of multistory buildings for lateral loads. | W12, W13, W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C2.1 |
| 2 | Semester work | C2.1 , C2.2 |
| 3 | Final Term Examination | C2.1 , C2.2 , C4.1 |

### 7.2 Assessment Schedule:

| No | Method | Week |
|---|---|---|
| 1 | Mid Term Examination | week(8) |
| 2 | Semester work | weekly |
| 3 | Final Term Examination | week(15) |

### 7.3 Weighting of Assessments:

| No | Method | Weight |
|---|---|---|
| 1 | Mid term examination | 15% |
| 2 | Semester work | 18% |
| 5 | Final term examination | 67% |
| Total | | 100% |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | *El-Behairy, Shaker, "Handbook of Concrete Structures", 2019.* |
| 2 | *Hilal, M., "Design of Reinforced Concrete Halls", Cairo University,* 2005. |

## 9. Facilities Required for Teaching and Learning:

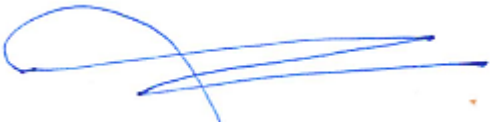
| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Design of concrete structures for serviceability. | 7 | C2.1 |
| 2 | Design of water structures (swimming pools, rectangular tanks, circular tanks). | 7 | C2.1 |
| 3 | Design of surface of revolution structures. | 7 | C2.1 |
| 4 | Design of pre-stressed concrete structures. | 7 | C4.1 |
| 5 | Design of multistory buildings for lateral loads. | 7 | C2.2 |

**Course Coordinator: Prof. Dr. Salah El-Din El-Said El-Metwally ,**

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**



**Date of Approval: December** 2021

| **Course: Concrete-3** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve an optimum design of Reinforced Concrete Water Structures.<br><br>C2.2 Design Special Structures such as Prestressed members , Surface of Revolution. |
| C4. Use the codes of practice of all civil engineering disciplines effectively and Professionally | C4.1 Use the codes of practice in Serviceability limit states and Lateral Load Design |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Construction Engineering Department |
| **Course Code** | STE 8422 |
| **Year/ Level** | Second term - 4th year |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 4 | 2 | |

## 2. Course aims:

| No. | Aim |
|---|---|
| 7 | Exploit the codes of practice of all civil engineering steel disciplines effectively and professionally. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C2.1 | Achieve the optimum Design for fatigue ,stringers and cross girders and main girders of composite section. |
| C4.1 | Use the steel codes in Calculation of forces on the different elements of bridges and Permissible design stresses . |
| C4.2 | Use the codes to design of joints , bridge bracings ,Roadway bridges, sidewalk elements, truss bridges and bridges bearings. |

## 4. Course Contents:

| No. | Topics | week |
|---|---|---|
| 1 | Parts and Types of Railway Steel Bridges | 1,2 |
| 2 | Loads on Bridges and Allowable Stresses | 3,4 |
| 3 | Design of Floor Beams of Railway | 5 |
| 4 | Design of Main Girder | 6 |
| 5 | Design of Stiffeners | 7 |

| | | |
|---|---|---|
| 6 | Parts and Types of Roadway Steel Bridges | 9 |
| 7 | Loads on Bridges and Allowable Stresses | 10 |
| 8 | Design of Floor Beams of Railway Bridge | 11 |
| 9 | Analysis and Design of Wind Bracing System | 12 |
| 10 | Design of Main Girder | 13 |
| 11 | Box Section of Bridge Truss | 14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for disabled Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C4.1 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | C4.2 |
| 3 | Final Term Examination | C4.1 , C4.2 , C2.1 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 8 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | weekly |
| 3 | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|

| | | |
|---|---|---|
| **1** | Mid Term Examination | 20 |
| **2** | Semester work (Quizzes, presentation, Portfolio) | 20 |
| **3** | Final Term Examination | 60 |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| **1** | Egyptian Code of Practice for Steel Construction (Load and Resistance Factor Design (LRFD) (205) Ministerial Decree No. 359-2007, Ministry of Housing, Utilities and Urban Development. |
| **2** | Egyptian Code of Practice for Steel Construction and Bridges (ASD) Code No. ECP 205-2001, Edit 2009. Ministry of Housing, Utilities and Urban Development. |
| **3** | Unsworth, John F. "Design and Construction of Modern Steel Railway Bridges". CRC Press, 2017. |
| **4** | Lebet, Jean-Paul, Hirt, Manfred A. "Steel Bridges - Conceptual and Structural Design of Steel and Steel-Concrete Composite Bridges". Taylor & Francis, 2013. |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

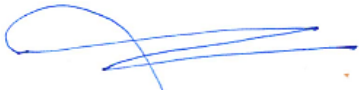
## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Parts and Types of Railway Steel Bridges | 7 | C4.1 |
| 2 | Loads on Bridges and Allowable Stresses | 7 | C4.1 |
| 3 | Design of Floor Beams of Railway | 7 | C4.1 |

| | | | |
|---|---|---|---|
| 4 | Design of Main Girder | 7 | C4.2, C2.1 |
| 5 | Design of Stiffeners | 7 | C4.2, C2.1 |
| 6 | Parts and Types of Roadway Steel Bridges | 7 | C4.2, C2.1 |
| 7 | Loads on Bridges and Allowable Stresses | 7 | C4.2 |
| 8 | Design of Floor Beams of Railway Bridge | 7 | C4.2 |
| 9 | Analysis and Design of Wind Bracing System | 7 | C4.2 |
| 10 | Design of Main Girder | 7 | C4.2 |
| 11 | Box Section of Bridge Truss | 7 | C4.2 |

**Course Coordinator: A.Prof.Dr. Fikry Abdo Salem**

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**



**Date of Approval: December 2021**

| **Course: Steel Constructions 2** | |
|---|---|
| **Program LOs** | **Course LOs** |
| **C2.** Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1 Achieve the optimum Design for fatigue ,stringers and cross girders and main girders of composite section. |
| **C4.** Use the codes of practice of all civil engineering disciplines effectively and professionally. | **C4.1** use the steel codes in Calculation of forces on the different elements of bridges and Permissible design stresses .<br><br>**C4.2** Use the codes to design of joints , bridge bracings ,Roadway bridges, sidewalk elements, truss bridges and bridges bearings. |

**University:** Mansoura University
**Faculty:** Faculty of Engineering
**Program:** Civil Engineering Program

## 1. Basic Information

| | |
|---|---|
| **Program Title** | Civil Engineering Program |
| **Department offering the Program** | Structural Engineering Department + Public Works Engineering Department + Hydraulics Engineering Department. |
| **Department Responsible for the Course** | Structural Engineering Department |
| **Course Code** | STE 8425 |
| **Year/ Level** | Fourth year - First Semester |
| **Specialization** | Major |
| **Authorization data of course specification** | December 2021 |

| **Teaching Hours** | Lectures | Tutorial | Practical |
|---|---|---|---|
| | 2 | 1 | - |

## 2. Course aims:

| No. | Aim |
|---|---|
| 6 | Design FORTRAN programs for analyzing real structures and describe the fundamentals and basic theories of using computer in analyzing structural problems. |

## 3. Learning Outcomes (LOs):

| | |
|---|---|
| C1.1 | Select appropriate mathematical methods for analysis Shear Building and Calculating natural frequency of one and two degree of freedom dynamic problems. |
| C1.2 | Define the concepts of dynamic loads, types of nonlinearity in structures, mathematical model and free body diagram, and Jacobi's method for calculating the natural frequency and the corresponding Eigenvectors. |
| C2.1 | Achieve an optimum design of different structures by calculating Critical Buckling Load of columns having different end conditions and transmissibility of dynamic loads to the foundation and Steady State Response. |
| C2.2 | Design Fortran program for solving and analyzing the structural behavior of different structures. |

## 4. Course Contents:

| No. | T | week |
|---|---|---|
| 1 | Using of stiffness method for plane structures. | W1-W2-W3-W4-W5 |
| 2 | Design of Fortran programs and it's application for civil engineering | W6-W7-W9-W10 |
| 3 | Using specialized computer software, and packages | W11-W12-W13- W14 |

## 5. Teaching and Learning Methods:

| No. | Teaching Method |
|---|---|
| 1 | Interactive lectures (hybrid learning) |
| 2 | Discussion Sessions |
| 3 | Flipped classroom |

## 6. Teaching and Learning Methods for Disable Students:

| No. | Teaching Method |
|---|---|
| 1 | Additional Tutorials |
| 2 | Online lectures and assignments |

## 7. Student Assessment:

### 7.1 Student Assessment Methods:

| No. | Assessment Method | LOs |
|---|---|---|
| 1 | Mid Term Examination | C1.1, C1.2 |
| 2 | Semester work | C2.1 |
| 3 | Final Term Examination | C1.2, C2.1, C2.2 |

### 7.2 Assessment Schedule:

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Mid Term Examination | 8 |
| 2 | Semester work (Quizzes, presentation, Portfolio) | weekly |
| 3 | Final Term Examination | 15 |

### 7.3 Weighting of Assessments:

| No. | Assessment Method | Weights |
|---|---|---|
| 1 | Mid Term Examination | 10% |
| 2 | Semester work (Quizzes, presentation, Portfolio) | 20% |
| 3 | Final Term Examination | 70 % |
| Total | | 100 % |

## 8. List of References

| No. | Reference List |
|---|---|
| 1 | *Igor A. Karnovsky, Advanced methods of structural analysis, 2010.* |
| 2 | *M. Paz and W. Leigh, Structural Dynamics. Boston, MA: Springer US, 2004.* |

## 9. Facilities Required for Teaching and Learning:

| No. | Facility |
|---|---|
| 1 | Lecture Classroom |
| 2 | White Board |
| 3 | Data Show System |
| 4 | Visualizer |
| 5 | Presenter |
| 6 | Sound System |

## 10. Matrix of Knowledge and Skills of the Course:

| No. | Topic | aim | LO's |
|---|---|---|---|
| 1 | Using of stiffness method for plane structures. | 6 | C1.1, C1.2 |
| 2 | Design of Fortran programs and it’s application for civil engineering | 6 | C1.1, C1.2 |
| 3 | Using specialized computer software, and packages | 6 | C2.1, C2.2 |

**Course Coordinator:** Prof. Dr/ Mohammed Naguib Abou El-Saad

**Head of Department: Prof. Dr. Mohamed Elsaied El-Zoughaiby**

**Date of Approval: December 2021**

| **Course: Structure analysis using Computer** | |
|---|---|
| **Program LOs** | **Course LOs** |
| C1. Select appropriate and sustainable technologies for construction of buildings, infrastructures, and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and strength of Materials, Surveying, Soil Mechanics, Hydrology and Hydraulics. | C1.1-Select appropriate mathematical methods for analysis Shear Building and Calculating natural frequency of one and two degree of freedom dynamic problems.<br><br>C1.2-Define the concepts of dynamic loads, types of nonlinearity in structures, mathematical model and free body diagram, and Jacobi's method for calculating the natural frequency and the corresponding Eigenvectors. |
| C2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures, Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Hydraulics, Water Resources and Harbors. | C2.1- Achieve an optimum design of different structures by calculating Critical Buckling Load of columns having different end conditions and transmissibility of dynamic loads to the foundation and Steady State Response.<br><br>C2.2- Design Fortran program for solving and analyzing the structural behavior of different structures. |