1. **Basic Information**

**Course Title**: Bridges Construction Technology **Code**: STR609

**Lecture**: 3 Hour T**utorial**: **Practical**: - **Total:**3 Hour

**Program on which the course is given:** **Program on which the course is given:** M. Eng., M. sc., PhD/ Structural Engineering

**Compulsory or Elective element of program: Elective**

**Department offering the program:** Civil Engineering

**Department offering the course:** Civil Engineering

**Academic year / level:** M. Eng., M. sc., PhD / 2015-2016

**Date of specifications approval:** 2012

1. **Professional Information**
2. **Overall aims of course**

1- Introduce students to modern bridge construction methods.

2- Help students select the proper construction technique based on the project conditions.

3- Provide students with the knowledge and necessary tools to properly select the construction equipment.

1. **Intended Learning outcomes of Course (ILOs)**

**This course intends to satisfy the following structures program ILO’s: a.1, a.2, a.3, b.1, b.2, b.6, c.1, d.1 and d.2.**

1. **Knowledge and Understanding:**

a.1. Identify specialized knowledge in bridges construction technology.(A.1)

a.2. Describe the two way impact of the relationship between bridge construction practice and its effect on the environment.(A.2)

a.3. Outline the scientific developments in the area of bridge construction technology.(A.3)

1. **Intellectual Skills**

b.1. Analyze and assess information in bridge construction and draw analogies to solve site problems.(B.1)

b.2. Conduct a research study and/or write a scientific essay about construction technology for different types of bridges.(B.2)

b.3. Account for the development of concrete and steel bridges.(B.6)

1. **Professional and Practical Skills**

c.1. Master basic professional and modern skills for bridges construction technology.(C.1)

1. **General and Transferable Skills**

d.1. Use different sources for obtaining information and knowledge.(D.1)

d.2. Work in a group and lead a team in familiar professional contexts.(D.2)

1. **Contents**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No** | **Topic** | **No. of hours** | **ILOs** | **Teaching / learning methods and strategies** | **Assessment method** |
| 1 | Types of Bridges and methods of construction of concrete and steel bridges | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 2&3 | Methods for precast bridges: I-beams & Super Tee’s | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 4&5 | Methods of Construction of precast segmental bridges  1. Erection on Falsework  2. Erection by Gantry  3. Erection by Crane  4. Erection by Lifting Frame  5. Full Span Erection Techniques | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 6&7 | In-situ concrete bridge construction techniques.  1.Cast in-situ Post Tensioned  2.Balanced Cantilever  3.Incrementally Launched | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 8 | Mid Term Exam | | | |  |
| 9, 10 | Other concrete bridges construction techniques   * Pier Head Rotation   •Arch Lowering  •Main Span Lifting  •Sky bridge | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 11,12 | Steel bridges fabrication & erection techniques | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 13 | Arch bridges construction | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 14 | Suspension bridges construction | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 15 | Cable – stayed bridges construction | 3 | a1, a2, a3, b1, b2, c1, d1, d2 | Lectures, & class activity | Assignments & exams. |
| 16 | Final exam | | | | |

1. **Teaching and Learning Methods**

\_\_x\_\_\_ Lectures

\_\_\_\_\_ Practical training / laboratory

\_\_\_\_\_ Seminar / workshop

\_\_\_\_\_ Class activity

\_\_\_\_\_ Case study

\_\_x\_\_\_ Assignments / homework

Other :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Student Assessment Methods**

\_\_\_x\_\_\_\_\_ Assignments to assess \_\_a1, a2, a3, b1, b2, c1, d1, d2\_\_\_\_.

\_\_\_\_\_\_\_\_ Quiz to assess \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_x\_\_\_\_\_ Mid-term exam to assess \_\_\_\_a1, a2, a3, b1, b2, b3 c1, d1, d2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_ Oral exam to assess \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_x\_\_\_\_\_ Final exam to assess \_\_\_\_\_a1, a2, a3, b1, b2, b3 c1, d1, d2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Other:\_\_\_\_\_\_\_\_\_\_to assess \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Assessment schedule**

Assessment 1 on weeks 5, 12

Assessment 2 Mid-term exam on week 8

Assessment 3 Final exam on week 15

1. **Weighting of Assessments**

Mid- Term Examination 20%

Final- Term Examination 67%

Practical Examination 00%

Semester Work 13%

Other 00%

Total 100%

1. **List of References**
   1. Course Notes

Durkee, J. “Steel Bridge Construction”, *Bridge Engineering Handbook.* Ed. Wai-Fah Chen and Lian Duan, Boca Raton: CRC Press, 2000

Prestressed Concrete Bridges (Structures and Buildings) 2nd Revised edition Edition, [Nigel Hewson](http://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&text=Nigel+Hewson&search-alias=books&field-author=Nigel+Hewson&sort=relevancerank), ICE Publishing; (2011), **ISBN-13:** 978-0727741134

Standard Specifications for Road and Bridge Construction, Illinoise Department of Transportation, Adopted January 1, 2012

* 1. Essential Books (Text Books)

Egyptian Code of Practice for Design of Reinforced Concrete and Prestressed Concrete Structures

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* 1. Periodicals Web sites, etc

ACI Structural Journal, American Concrete Institute www.aci.org

ACI Material Journal, American Concrete Institute www.asce.org

Journal of Structural Engineering, American Society of Engineers (ASCE) ………………………………………………

**Facilities Required for Teaching and learning**

Lectures room equipped with computer and data show, presentation board and research laboratory.

**Matrix of course aims and ILO’s**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course aims** | a1 | a2 | a3 | b1 | b2 | b3 | c1 | d1 | d2 |
| Introduce students to modern bridge construction methods. | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Help students select the proper construction technique based on the project conditions. | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Provide students with the knowledge and necessary tools to properly select the construction equipment. | √ | √ | √ | √ | √ | √ | √ | √ | √ |

**Course coordinator:** Prof. Dr.**Mona Kamal N. Ghali**

**Course instructor:** Prof. Dr.**Mona Kamal N. Ghali**

**Head of department:** Prof. Dr.**Ahmed Abdel Fatah Mahmoud Date: 1/10 / 2015**