Rehabilitation and Design of Concrete Bridges

1. **Course number and name:** 020COCGS5 Rehabilitation and Design of Concrete Bridges

2. **Credits and contact hours:** 4 ECTS credits, 2x1.25 hours

3. **Name(s) of instructor(s) or course coordinator(s):** Kamal SAFA

4. **Instructional Materials:**

    a. Conception et construction des ponts par Michel Vilogeux (Ecole des Ponts)

    b. Conception et construction des ponts par Jean-Armand Calgaro (Ecole des Ponts)

    c. Projet et construction des ponts – Jean-Armand Calgaro

    d. Conception des ponts – A Bernard – Gely

    e. Maintenance et Réparation des Ponts – Jean-Armand Calgaro et Roger Lacroix

5. **Specific course information**
    a. **Catalog description:** Provide the necessary information for the design of the various types of bridges.

    b. **Prerequisites or co-requisites:** 020STRGS4 Structures

    c. **Required:** Required major course for Public Works and Transportation Specialty students.

6. **Educational objectives for the course**
    a. **Specific outcomes of instruction:**
    By the end of the course, the student will be able to:
        - Explain the different elements necessary for bridge design
        - Identify the necessary information pertaining to bridge equipment
        - Design piers and abutments
        - Identify the different types of reinforced concrete bridges (prestressed concrete, steel, etc…) and their field of application
        - Describe the methods used for the restoration and strengthening of existing bridges
        - Identify the steps required for monitoring existing bridge structures

b. PI addressed by the course:

PI	1.2	1.4	2.2	3.1
Covered	yes	yes	yes	yes
Assessed				

7. Brief list of topics to be covered:

1. Brief historical overview of bridges (1.5 hours)
2. Generalities (1.5 hours)
3. Functional data (1.5 hours)
4. Bridge equipment (3.5 hours)
5. Traffic load calculations (2.5 hours)
6. Distribution of horizontal forces on supports (1.5 hours)
7. Piers and abutments (3 hours)
8. Steel bridges (3 hours)
9. Reinforced and prestressed concrete bridges (3.5 hours)
10. Precast prestressed concrete bridges (2 hours)
11. Girder bridges
12. Suspension bridges
13. Cantilever bridges

(5 hours)

14. Rehabilitation and reinforcement of concrete bridges (5.5 hours)
15. Bridge monitoring and maintenance (1.5 hours)