



CIVE 5110-201 Inspection and Monitoring of Civil Infrastructure (3-0-3)

Syllabus Spring 2016

Instructor:

Tzuyang Yu (Falmouth Hall 107C, ext.4-2288, tzuyang_yu@uml.edu)

Wednesday and Friday 2:00 p.m.~2:50 p.m. (or by appointment)

Teaching Assistant:

N/A

Time and Venue:

Monday, 6:30 p.m.~9:20 p.m., Kitson Hall 302

Prerequisite: N/A

Course Description

In this course, principles and applications of inspection and monitoring techniques for the condition assessment of aged/damaged/deteriorated civil infrastructure systems such as buildings, bridges, and pipelines, are introduced. Current nondestructive testing/evaluation (NDT/E) methods including optical, acoustic/ultrasonic, thermal, magnetic/electrical, radiographic, microwave/radar techniques are addressed with a consideration on their theoretical background. Wired and wireless structural health monitoring (SHM) systems for civil infrastructure are also covered. Applications using inspection and monitoring techniques are discussed with practical issues in each application.

Grading Policy

There will be two homework assignments (20% each), one mid-term exam (30%) and one final exam (30%). All homework assignments must be turned in on time. The late policy is stated as follows: (1) 50% reduction for "less than one day" late; (2) 100% reduction for "more than one day" late.

Textbook

T.G. Beckwith, R.D. Marangoni, J.H. Lienhard *Mechanical Measurements*, 6th ed., Prentice Hall, Upper Saddle River, NJ; 2007.

References

D. Huston, *Structural Sensing, Health Monitoring, and Performance Evaluation*, 1st ed., CRC Press, Taylor and Francis Publishing; 2009.

W. Bolton, *Mechatronics – Electronic Control Systems in Mechanical and Electrical Engineering*, 4th Ed., Prentice Hall, Harlow, UK; 2008.

T. Yu, *Damage Detection of GFRP-Concrete Systems Using Electromagnetic Waves*, Lambert Academic Publishing, Koln, Germany; 2009.

P.E. Mix, *Introduction to Nondestructive Testing – A Training Guide*, 2nd ed., John Wiley & Sons, Hoboken, NJ; 2005.

Schedule

Week	Date	Topics
1	01/25	Introduction; Engineering failures
2	02/01	Optical methods
3	02/08	Acoustic and ultrasonic methods
4	02/16	Thermal methods
5	02/22	Magnetic and electrical methods
6	02/29	Microwave/radar methods
7	03/07	Mid-term exam
8	03/14	<i>Spring Recess</i>
9	03/21	Case studies
10	03/28	Radiographic and other methods
11	04/04	Signal processing and data interpretation
12	04/11	Strain gauges, accelerometers, LVDT, fiber optic, and piezoelectric sensors
13	04/22	Shape memory alloy, electrorheological fluids, and microelectromechanical systems
14	04/25	Wireless sensing and vibration monitoring