CE573 – STRUCTURAL DYNAMICS [Fall 2016]	MWF 10:30-11:20 am, HAMP 2118 http://engineering.purdue.edu/~ce573
Instructor & TA: Ayhan Irfanoglu Office hours:	HAMP 4117 Ph: 49-68270; ayhan@purdue.edu

OBJECTIVE
To learn the fundamentals of modeling and analyzing dynamic behavior of civil engineering structures.

PREREQUISITES
- CE474 Structural Analysis II [@ Purdue], a.k.a. "Modern/Matrix/Computer Methods of Structural Analysis". In short, you should know how to model and analyze multi-degree of freedom structures for static analysis, including deriving structural stiffness [influence] coefficients.
- Good understanding of fundamental laws of physics, linear algebra including matrix operations, basic ordinary differential equations, and basic partial differential equations.

OUTLINE
1. **Single-degree-of-freedom linear systems**
   - Numerical approach
   - Analytical approach (equation of motion; D'Alembert's approach)
   - Free vibration; forced harmonic vibration; dynamic amplification factor
   - Vibration isolation; dynamic response sensors
   - Forced transient vibration; Fourier series expansion for periodic loading and response
   - Impulse response; response spectrum

2. **Lumped Mass Multi-degree-of-freedom (MDOF) linear systems**
   - Free vibration: generalized coordinates, modal decomposition analysis method
   - Forced vibration
   - Approximate methods to determine modal shapes and periods
   - Lagrange's equation of motion
   - Response of MDOF systems to earthquake ground motions; response spectrum revisited

3. **Continuous (distributed mass) linear systems**
   - One-dimensional elastic bodies; wave nature of motion
   - Beam vibration

4. **Equivalent idealized SDOF systems** (time permitting)

GRADING
- Homeworks: 15% (each question will have equal weight unless otherwise noted); due on announced date at the beginning of classroom meeting; late homeworks will not be accepted unless you had instructor's permission ahead of time.
- Two term exams (in-class evening exams, closed book): 25% each
- One final exam (in-class, closed book): 35%

Final grades will be based on standard grading system (A≥90, B≥ 80, C≥70, D≥60, F <60) at the discretion of the instructor.

COLLABORATION POLICY

Homeworks: Please attempt and try to solve homework problems on your own. See the instructor if you need assistance in understanding the concepts. Collaboration is permitted but you have to write down your own solution. Please do not duplicate solutions. It is recommended that you check your level of understanding of the course material through homeworks. If you collaborate but not work in solving homework assignments, you might be blindsided in the exams. **Homework and exam solutions from previous years shall not be consulted. It is a violation of the course honor code and Purdue code if you make use of previous years' homework and exam solutions unless permitted by the instructor.**

Exams: No collaboration or sharing of any kind is allowed. Transgressors will be reported to the University for full disciplinary action and will receive a failing grade in this course.

COURSE HONOR CODE

By registering in this course, you agree to abide by the course honor code:

Never take unfair advantage of others in this class.

If you are caught taking unfair advantage of anyone associated with this class, including but not limited to cheating in an exam or harvesting/using/copying/plagiarizing homework and exam solutions from previous years or solutions manuals, you will receive a failing grade in the course –not just for that assignment. Furthermore, a formal complaint will be filed with the University for further disciplinary action.

Please know that you, i.e. the students, can report issues of academic integrity that you observe, either through the Office of the Dean of Students (purdue.edu/odos), call 765-494-8778 or email integrity@purdue.edu.

TEXTBOOK

There is no textbook for this class. You may benefit from reviewing books on vibrations and structural dynamics. The following list of books is given for your reference. It is by no means exhaustive.

- Berg, G.V. – Elements of Structural Dynamics, Prentice Hall, 1988
- Biggs, J.M. – Introduction to Structural Dynamics, McGraw-Hill, 1964
- Chopra, A.K. – Dynamics of Structures: A Primer, Earthquake Eng. Research Inst., Oakland, CA, 1981
- Chopra, A.K. – Dynamics of Structures, Theory and Appl. to Earthquake Eng., 4th ed., Prentice Hall, 2011
- Clough R.W. and J. Penzien – Dynamics of Structures, McGraw-Hill, 1975
- Craig, R.R. – Structural Dynamics: an Introduction to Computer Methods, John Wiley & Sons, 1981
- Craig, R.R. and A.J. Kurdila, Fundamentals of Structural Dynamics, 2nd ed., Wiley, 2006
- Humar, J.L. – Dynamics of Structures, Balkema 2002
- Meirovitch, L. – Elements of Vibration Analysis, McGraw-Hill, 1986 (has several variants)
- Paultre, P. – Dynamics of Structures, Wiley, 2010
- Thomson, W.T. – Theory of Vibration with Applications, 2004 (has numerous editions)

ABSENCE DUE TO HEALTH PROBLEMS/CONCERNS

If you think you may have cold, flu, or any other contagious disease, or simply not feeling well, please: 1) see your doctor or visit PUSH as soon as possible; 2) do not come to class; you may safely consider yourself excused from attending class. You do not need to provide doctor's report for occasional classroom absence due to health concerns; just send an email to the instructor to inform him of your upcoming/recent absence.

In the case of a health problem prohibiting you from attending class for more than three consecutive class meetings or taking an exam on the scheduled day and time please be prepared to present a report from your doctor explaining your situation. If no doctor's report which states explicitly that you are not fit to take the exam is presented, no make-up exam will be arranged and a zero will be registered as the exam score.

Students missing classroom meetings are responsible for catching up with the rest of the class. If you have missed class due to health reasons, you may seek reasonable help from the instructor to go over the material you have missed but only after you obtain the class notes from a classmate and review them yourself first.

EMERGENCY PREPAREDNESS

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course.

1. The instructor will email you information through fall-2016-ce-57300-001@lists.purdue.edu. This is a one-way, broadcast type mailing-list and only the instructor can forward information through it.

2. If you want to communicate your questions to the instructor directly, the primary/best way to reach him is via email, i.e., at ayhan@purdue.edu.

3. The course website at http://engineering.purdue.edu/~ce573 will be updated with information.

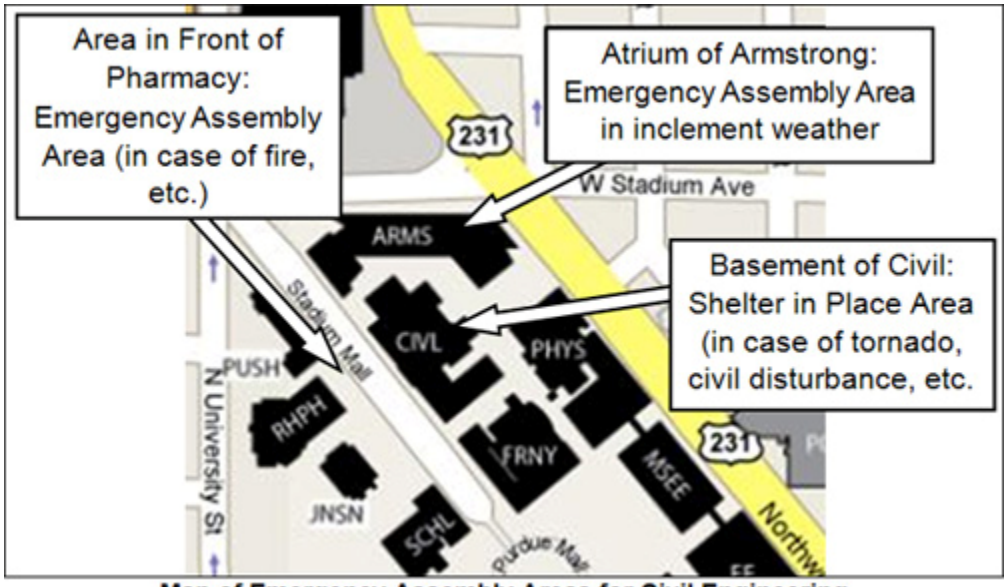
In the case of a campus emergency closure, virtual classroom meetings, for example via AdobeConnect, could be held. Should such an action become necessary, you will receive an email with information as to how you could participate in virtual classroom meetings. But until then, we will keep our classes as "real" as possible.

If for any pandemic or other emergency reasons one or more of the exams need to be cancelled the following weights will be used in calculating the final grade for performance in this course:

- One term exam cancelled: HW: 15%, one term exam: 35%; final exam: 50%
- Both term exams cancelled: HW: 30%; final exam: 70%
- Final exam cancelled: HW: 20%; term exams: 40% each

Final grades will be based on standard catalog procedure, at the discretion of the instructor.

Please learn the exit routes and read the building emergency procedures for HAMP. You can find relevant documents on https://engineering.purdue.edu/CE/Safety/Links.



Map of Emergency Assembly Areas for Civil Engineering