

**Term A: Instructor – Prof. H. Hong**

Part 1 – Single-Degree-of-Freedom Systems (SDOF)  
(Chapter designations refer to notes by Dr. Hong)

1. Mathematical Description and Solution of the Problem
2. Free Vibration
3. Response to Harmonic and Periodic Loads
4. Response to Transient Loads
5. Numerical Evaluation of Dynamic Response
6. Response and Design Spectrum
7. Generalized SDOF Systems and Rayleigh's Method

**Term B: Instructor – John Kilpatrick**

Part 2 – Multi-Degree-of-Freedom Systems (MDOF)

1. Free Vibration of MDOF Systems – I
  - 1.1. Free Undamped Vibration
2. Free Vibration of MDOF Systems – II
  - 2.1. Generalized Coordinates
3. Forced Vibration of MDOF Systems
  - 3.1. Forced Undamped Vibrations
  - 3.2. Forced Damped Vibration
4. Modal Analysis
  - 4.1. Harmonic Excitation
  - 4.2. Response to Ground Motion
  - 4.3. Spectral Approach to Transient Motion
  - 4.4. Modal Equivalent Model
5. Response to Random Loads
  - 5.1. General
  - 5.2. Basic Statistical Characteristics
  - 5.3. Response to Random Load in SDOF
  - 5.4. Response of Multi-Degree-of-Freedom Systems
    - 5.4.1. Fully-Correlated Loads
    - 5.4.2. Partially Correlated Loads
6. Response to Gusting Wind
  - 6.1. General
  - 6.2. Wind Loading by 1995 NBCC
  - 6.3. Distributed Random Loading Due to Wind
  - 6.4. The Along-Wind Response of Line-like Structures
7. Fatigue
  - 7.1. General
  - 7.2. Fatigue Analysis

<b>Lectures:</b>	10:00AM-11:00AM	Monday & Wednesday	ESB2094
<b>Tutorials:</b>	3:00PM-5:00PM	Wednesday	TH3101

Tutorials will include a set of nine (9) "problems" that will be handed out during the Wednesday tutorial, to be worked on during the tutorial and submitted on the due date, usually the following Monday. The latest acceptable submission is noon on Monday, in the CEE490b basket in the BLWTL – Room 103. There will be two (2) assignments relating to an experiment that will be performed in small groups. There will be one (1) mid-term quiz to be performed during the tutorial period on February 18, 2004.

### **Aims and Objectives for Term B**

1. MDOF Systems and Forced Vibrations
  - 1.1. Derive equation of motion for multi-degree-of-freedom systems
  - 1.2. Calculate eigenvalues and eigenvectors
  - 1.3. Solve MDOF systems using modal analysis and superposition
  - 1.4. Determine response to ground motion based on spectral approach
  - 1.5. Be familiar with dynamic analysis software
2. Response to Random Loads
  - 2.1. Understand the basic concepts of stochastic processes, correlation and autocorrelation functions
  - 2.2. Apply concept of power spectral density function for wind and earthquake engineering
  - 2.3. Draw conclusions from peak factor observations
3. Response to Gusting Wind
  - 3.1. Design structures according to the National Building Code of Canada for wind effects
4. Fatigue
  - 4.1. Recognise the fatigue problem due to repeated loading
  - 4.2. Design structures to deal with fatigue

### **Contact Information**

Instructor: John Kilpatrick  
Office: ESB3039 (office hours) & BLWTL Room 150  
Secretary: Karen J. Norman (BLWTL Room 103)  
e-mail: [jkilpatr@uwo.ca](mailto:jkilpatr@uwo.ca)  
TA's: tba  
Office Hours: tba