**STRUCTURAL DYNAMICS**
Rose School, Fall 2017

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# COURSE OUTLINE

1. **Introduction**
   1.1. Dynamic response
   1.2. Dynamic loading
   1.3. Dynamic degrees of freedom
   1.4. Modeling a dynamic problem
   1.5. Dynamic analysis of structures

## Part 1 - Single Degree of Freedom

2. **Equation of Motion**
   2.1. Dynamic load
   2.2. Effect of gravity forces
   2.3. Motion of the support
3. **Free Response**
   3.1. Characteristic equation
   3.2. Undamped free response
   3.3. Conservation of energy
   3.4. Damped free response
   3.5. Coulomb damping
   3.6. Logarithmic decrement and free vibration test
4. **Forced Response to Harmonic Loading**
   4.1. Forced response of conservative systems
   4.2. Forced response of dissipative systems
   4.3. Resonance
   4.4. Dynamic amplification factors
   4.5. Complex frequency response
   4.6. Vibration measurement instruments
   4.7. Vibration isolation

## Part 2 - Multi-Degrees of Freedom Systems

20.6. Guyan-Irons reduction method

21. **Numerical Methods for Eigenproblems**
    21.1. Iterative methods
    21.2. Transformation methods
    21.3. Subspace iterations

22. **Direct Integration of Linear Systems**
    22.1. Central difference method
    22.2. Newmark methods
    22.3. Estimation of the highest eigenvalue
    22.4. Analysis of the accuracy
    22.5. Selection of a numerical direct integration method

## COURSE INFORMATIONS

1. Teaching :
   a) Lecture : 3 hours per day from Monday to Thursday.
   b) Recitation/Tutorial : 3 hours every day.
2. Evaluation :
   a) 14 homeworks (70%).
   b) 1 final exam (30%).

## COURSE MATERIALS

1. **Textbook :** *Dynamics of Structures*, P. Paultre.
2. **Software :** LAS (will be distributed to all students).