

## ARCH 631. Study Guide for Exam 3

This guide is not providing “answers” for the conceptual questions. It is a list of topical concepts and their application you should be familiar with. It is an *aid* to help prepare for the mid-term exam.

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### Covers material of Lectures 15, 16, 17, 19 & 20

#### *General: Lateral Loads*

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|---|--|
| <input type="checkbox"/> Lateral stability vs. gravity loading  | <input type="checkbox"/> Selective placement of horizontal and vertical rigid planes |
| <input type="checkbox"/> Resisting mechanisms   | <input type="checkbox"/> Member orientation for frame action                         |
| <input type="checkbox"/> “In-plane” forces  | <input type="checkbox"/> Mechanism choices with building height                      |
| <input type="checkbox"/> Load transfer and shear planes   | <input type="checkbox"/> Behavior of multistory frames under lateral load.           |
| <input type="checkbox"/> Torsional deformations   | <input type="checkbox"/> Behavior of “tubes”   |
| <input type="checkbox"/> Horizontal vs. vertical shear planes   | <input type="checkbox"/> Serviceability issues, dampers                              |
| <input type="checkbox"/> Diaphragm action   |  |
| <input type="checkbox"/> Diaphragms, shear walls, bracing, frame action, drag struts, chevron, knee, etc. |  |

#### *Hazards Design*

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| <input type="checkbox"/> Equivalent static wind pressure, direction, size with respect to building height, formula | <input type="checkbox"/> Overturning  |
| <input type="checkbox"/> Wind speed & 50 year return period  | <input type="checkbox"/> Resonance, frequency, period of vibration, damping |
| <input type="checkbox"/> Vortex shedding   | <input type="checkbox"/> Stiffness - lateral and torsional                  |
| <input type="checkbox"/> Flutter   | <input type="checkbox"/> Center of mass, center of rigidity                 |
| <input type="checkbox"/> Windward, leeward   | <input type="checkbox"/> Drift and shear distribution by floor mass         |
| <input type="checkbox"/> Flood zones & “100 year flood”  | <input type="checkbox"/> Pounding, re-entrant corners, soft stories         |
| <input type="checkbox"/> Hydrostatic pressure calculation (linear with depth of water by density = $\gamma h$ )    | <input type="checkbox"/> Seismic joints, base isolation, tuned mass dampers |
| <input type="checkbox"/> Dynamic loads   | <input type="checkbox"/> Period length relationship to stiffness            |
| <input type="checkbox"/> Fault zones, focus (hypocenter), epicenter  | <input type="checkbox"/> “Spring-mass” assembly model                       |
| <input type="checkbox"/> Magnitude, duration, intensity of ground motion   | <input type="checkbox"/> Redundancy and continuity                          |
| <input type="checkbox"/> Liquefaction, landslides, subsidence, tsunami   | <input type="checkbox"/> Non-structural elements contribution to stiffness  |
| <input type="checkbox"/> Inertial forces (mass, acceleration)  | <input type="checkbox"/> Spectrum or spectral response                      |
| <input type="checkbox"/> Base shear and code formulas  | <input type="checkbox"/> NEHRP (actual name and function)                   |

### *General: Connections and Tension Members*

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|---|---|
| <input type="checkbox"/> Normal stress (compression & tension)                        | <input type="checkbox"/> Forces and stresses resisted by nails, adhesives, split ring connectors, bolts, etc. |
| <input type="checkbox"/> Shear stress (non beams)                                     | <input type="checkbox"/> Rupture vs. yielding in steel  |
| <input type="checkbox"/> Bearing stress   | <input type="checkbox"/> Bolt designations  |
| <input type="checkbox"/> Pinned joint vs. rigid joint                                 | <input type="checkbox"/> Weld strengths   |
| <input type="checkbox"/> Single shear vs. double shear                                | <input type="checkbox"/> Throat thickness   |
| <input type="checkbox"/> Simple shear connector                                       | <input type="checkbox"/> Fillet, butt, plug, slot   |
| <input type="checkbox"/> Connected area for longitudinal shear stress calculation     | <input type="checkbox"/> Coping   |
| <input type="checkbox"/> Nail capacity and pitch for resisting longitudinal shear     | <input type="checkbox"/> Block shear rupture  |
| <input type="checkbox"/> Effective area vs. net area vs. gross area of tension member | <input type="checkbox"/> Web “crippling”  |

### *Timber Design*

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|---|--|
| <input type="checkbox"/> Lumber vs. engineered timber characteristics (ex: glulam)  | <input type="checkbox"/> Column stability factor, $F_{CE}$ & $l/d$           |
| <input type="checkbox"/> Light-frame vs. heavy timber construction  | <input type="checkbox"/> Interaction equations (P- $\Delta$ )                |
| <input type="checkbox"/> Lumber grading   | <input type="checkbox"/> Connection stresses                                 |
| <input type="checkbox"/> Various strengths (directionality, wood type, etc.)  | <input type="checkbox"/> Design vs. analysis                                 |
| <input type="checkbox"/> Built-up member types  | <input type="checkbox"/> Bolt designations                                   |
| <input type="checkbox"/> Design methodologies and obtaining allowed stresses (adjustment factors - duration, multiple member use....) | <input type="checkbox"/> Effective net area                                  |
| <input type="checkbox"/> Creep  | <input type="checkbox"/> Connection types                                    |
| <input type="checkbox"/> Nominal dimensions   | <input type="checkbox"/> Single vs. double shear                             |
| <input type="checkbox"/> Beam self weight with respect to material density (variable for wood types)                                  | <input type="checkbox"/> Bolt capacity charts and relation to wood strengths |
|   | <input type="checkbox"/> Allowable shear capacity charts for diaphragms      |
|   | <input type="checkbox"/> Chord forces in diaphragms                          |