ARCH 631. Study Guide for Exam 2

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.

Covers material of Lectures 7, 8, 10, 11, 12, 13 & 14

General: Rigid Frames

- ☐ Rigid vs. non-rigid pinned frames
- ☐ Rigid frame behavior
- ☐ Connection types and load/moment transfer
- ☐ Moment "redistribution"
- ☐ Methods for analysis of statically indeterminate frames
- ☐ Effect of relative frame member stiffnesses
- ☐ Stiffness (relative to EI/L through Δ, or AE/L through δ)
- ☐ Sidesway
- ☐ Cantilever method with lateral forces

General: Plates & Grids

- ☐ Plate vs. slab
- ☐ One-way vs. two-way behavior
- ☐ Aspect ratio (with respect to bay dimensions)
- ☐ Space frame vs. grid
- ☐ Unit width for design
- ☐ Moment redistribution
- ☐ Pan joists, T sections & effective width of flange
- ☐ Drop panels
- ☐ Boundary conditions & effect on deflections / moments
- ☐ Point loads and effect on deflections / moments
- ☐ Simplified Frame Analysis & "Strip" method
- ☐ Design shear & moments (spans "integral with support", first interior support, etc.)
- ☐ Direct design method for two-way slabs & M_o
- ☐ Solutions for large shear at space frame supports
- ☐ Moment of inertia with respect to folded plates
- ☐ Reason for stiffening of folded plates
- ☐ Live load reduction
- ☐ Thickness as a fraction of bay span (L)
- ☐ "Punching" shear at columns

General: Membranes & Shells

- ☐ Appropriate loads & primary stresses
- ☐ Air-supported vs. air-inflated
- ☐ Materials, durability, and punctures
- ☐ Profiles and wind effects
- ☐ Shell vs. not shell (stresses are key)
- ☐ Meridional vs. Hoop
- ☐ Shell forces vs stresses (with respect to thickness and strips)
- ☐ Tension vs. compression rings
- ☐ "Thrust"
- ☐ Buckling and "snap-through"
- ☐ Anticlastic shell properties
- ☐ Pressure vs. membrane stress
- ☐ Curvature and membrane stress
- ☐ Hyperbolic paraboloid

General: Planning

- ☐ One-way vs. two-way systems
- ☐ "Collectors"
- ☐ Vertical & horizontal grid considerations
- ☐ Long span considerations
- ☐ Effect of loading types on system efficiency
- ☐ Options for corners, large spaces, etc.
- ☐ Integration with building services
- ☐ Fire safety and planning
- ☐ "Weakness" Areas (Tolerances, Lateral bracing, etc.)

Reinforced Concrete

- ☐ Cast-in place, precast, prestressed (pretensioned), post-tensioned
- ☐ Constituents to make concrete
- ☐ Slump
- ☐ Behavior in compression vs. tension of concrete
- ☐ Design methodology
- ☐ 28-day compressive strength
- ☐ Term "working stress design"
- ☐ Creep
- ☐ Camber (hogging & sagging)
- ☐ "composite"
- ☐ Transformed section
- ☐ Depth of the Whitney stress
- ☐ Moment capacity (or ultimate strength) vs. nominal moment (or strength)
- ☐ Factored design moment (or shear or ....)
- ☐ Design stress in reinforcement
- ☐ Design stress in concrete
- ☐ Reinforcement grades
- ☐ Reinforcement ratio
- ☐ Effective depth vs. depth of a beam
- ☐ Under-reinforced vs. over-reinforced
- ☐ Basis of maximum steel (related to evident strain)
- ☐ Purpose of minimum reinforcement area requirement
- ☐ Why development length is necessary
- ☐ Use of Strength Design Curves (R_n)
- ☐ Purpose of stirrup requirement when concrete capacity is available
- ☐ Diagonal tension cracks
- ☐ Stirrup strength
- ☐ Shrinkage
- ☐ Concrete cover and purpose
- ☐ #3 bar (meaning of the numeral)
- ☐ Purpose of compression reinforcement
- ☐ T-section behavior and stresses in flange
- ☐ One-way joists, vs. beams, vs. girders
- ☐ "Spandrel"
- ☐ One-way slab design and "unit" strip
- ☐ One-way vs. two-way slabs
- ☐ One-way vs. two-way shear (load & strength)
- ☐ Plate vs. Flat Slab
- ☐ Openings in slabs and control of openings
- ☐ Continuous beam analysis with coefficients
- ☐ Clear span / span length
- ☐ Columns with ties vs. spirals (stresses, factors, etc.)
- ☐ Interaction diagrams (P-Δ)
- ☐ Location of maximum shear in beams
- ☐ Live load reduction
- ☐ Beam self weight relationship to material density (150 lb/ft^3)
- ☐ Design vs. analysis