

1. COURSE

AR2D3. Design Studio VI (Mandatory)

2. GENERAL INFORMATION

2.1 Course	:	AR2D3. Design Studio VI
2.2 Semester	:	6 th Semester.
2.3 Credits	:	4
2.4 Hours	:	4 HT; 4 HP;
2.5 Duration of the period	:	16 weeks
2.6 Type of course	:	Mandatory
2.7 Learning modality	:	Face to face
2.8 Prerequisites	:	AR2D2. Design Studio V. (5 th Sem)

3. PROFESSORS

Meetings after coordination with the professor

4. INTRODUCTION TO THE COURSE

Design Studio VI: Mixed-Use Building raises the program and scale complexity introduced in Design Studio V (AR2D2, prerequisite) to a taller, mixed-use building that stacks residential, commercial, and/or civic uses and requires explicit coordination with building systems (structural, envelope, and MEP). Students design a building whose viability depends as much on development feasibility as on architectural resolution, and practice the project-management skills needed to carry a complex proposal from concept through a coordinated construction-ready design. This course is the foundation for the Urban Design Studio sequence that begins with Design Studio VII (AR3D1).

5. GOALS

- Design the programming and spatial organization of a mixed-use building at a scale and complexity greater than any single-use project in the sequence so far.
- Coordinate the structural, envelope, and building-system assemblies of a taller building within realistic floor-to-floor height constraints.
- Select an appropriate seismic lateral-force-resisting system and detail the ductility measures required for a mixed-use building of increased height.
- Evaluate the development feasibility of the proposed building – market, site, regulatory, and financial constraints – as part of the design process.
- Apply project-management principles (scope, schedule, budget) to the development of a complex design proposal.

6. COMPETENCES

AG-A05) Applies management principles and economic decision-making, considering risk, as a team member or leader, to manage projects in multidisciplinary environments. (Usage)

AG-A09) Creates architectural designs that satisfy aesthetic and technical requirements. (Usage)

AG-A12) Possesses the design skills needed to satisfy building users' requirements within cost constraints and building regulations. (Usage)

7. TOPICS

Unit 1: Large-Scale and Complex Buildings (12 hours)	
Competences Expected: AG-A09	
Topics	Learning Outcomes
• Programming and spatial organization at large scale: stacking diagrams, core-to-perimeter ratios, vertical circulation strategies, • Life safety and means of egress in large buildings: occupancy-based egress design, pressurized stairwells, refuge floors, fire compartmentalization, and NFPA/IBC requirements • Vertical transportation systems: elevator group design, sky lobbies, express/local zone strategies, escalators, and integration of vertical transport into building form • Hybrid and mixed-use building design: separating and linking residential, commercial, hotel, and civic programs; transfer floors, podium strategies, and shared amenity programming • Phased construction and building complexity: designing for construction staging, operational continuity, future expansion, and changeable use within long-lifespan complex buildings • Campus and master plan design at large scale: site organization, wayfinding, public realm, phasing, infrastructure coordination, and identity across a multi-building ensemble	• Identify the key design challenges - program complexity, life safety, vertical transport, and phasing - that distinguish large-scale buildings from smaller architectural projects [Familiarity] • Apply large-scale building design strategies to develop a spatial and programmatic organization for a complex multi-story or mixed-use building typology [Usage] • Evaluate a large-scale building design for programmatic coherence, life safety compliance, and operational efficiency [Assessment]
Readings : [Schierle2012]	

Unit 2: Building Systems and Assemblies (10 hours)	
Competences Expected: AG-A09	
Topics	Learning Outcomes
• Integration of building systems: coordinating structural frame, mechanical/electrical/plumbing (MEP), envelope, and interior fit-out within constrained floor-to-floor heights • Construction documentation for assemblies: details at 1:5, 1:10, and 1:20; section-through-wall details, sill and head conditions, and coordination between architectural • Construction tolerances and coordination: dimensional tolerances in concrete, steel, and masonry; clearances for MEP rough-in • Waterproofing and moisture management: below-grade waterproofing systems, drainage planes, vapor barriers, and flashing at penetrations • Fire-rated assemblies: UL-listed wall, floor, and ceiling assemblies; fire-stopping at penetrations, intumescent seals, and the architectural detailing required by fire codes • Prefabricated and modular assemblies: volumetric modular construction, panelized wall systems, and the design implications of off-site manufacturing tolerances	• Identify the principal building systems and describe how they are integrated and coordinated within a multi-story building assembly [Familiarity] • Develop construction-level details for a building assembly that correctly coordinate structural, envelope, and MEP systems within realistic tolerances and code requirements [Usage] • Evaluate a set of construction documents for assembly coordination quality, identifying conflicts, missing details, and buildability risks [Assessment]
Readings : [AllenIano2019]	

Unit 3: Seismic Design for Architecture (10 hours)	
Competences Expected: AG-A09	
Topics	Learning Outcomes
• Seismic hazards and site effects: fault rupture, ground shaking, liquefaction, landslide; site class effects on ground motion amplification • Lateral force-resisting systems for seismic resistance: moment frames, braced frames (concentric, eccentric), shear walls (reinforced concrete, wood), and dual systems • Ductility and capacity design: strong-column weak-beam, plastic hinge formation, confinement reinforcement in concrete columns, • Architectural integration of seismic systems: drift limits for cladding and partitions, seismic joints, diaphragm continuity, • Base isolation and energy dissipation: elastomeric and sliding bearings, tuned mass dampers, viscous dampers, and their impact on architectural detailing • Performance-based seismic design (PBSD): performance objectives (immediate occupancy, life safety, collapse prevention), nonlinear static pushover analysis,	• Describe the primary seismic force-resisting systems and explain how building codes classify seismic risk and prescribe detailing for ductile behavior [Familiarity] • Apply seismic design principles to the early-stage design of a building, selecting an appropriate lateral system and configuring plan [Usage] • Evaluate an architectural design for seismic vulnerability, identifying plan irregularities (re-entrant corners, diaphragm discontinuities) [Assessment]
Readings : [Schierle2012]	

Unit 4: Development Process and Feasibility (10 hours)	
Competences Expected: AG-A12	
Topics	Learning Outcomes
• Development phases: site identification, option agreement, due diligence, entitlement (zoning, permits), design • Due diligence for development sites: title review, environmental assessment (Phase I and II), geotechnical investigation, zoning analysis, utility availability, • Entitlements and permitting: land use approvals (re-zoning, variances, conditional use permits), building permits, impact fees (school, traffic, parks) • Feasibility study components: market support, site suitability, regulatory pathway, construction feasibility, financial pro forma (with sensitivity analysis), • Real estate pro forma basics: projected net operating income ($\text{NOI} = \text{gross potential rent} - \text{vacancy allowance} - \text{operating expenses}$), debt service coverage ratio (DSCR),	• Describe the major stages of the real estate development process - predevelopment, construction, lease-up, disposition - and the due diligence [Familiarity] • Prepare a feasibility study for a proposed development, including market analysis, site due diligence summary, entitlement pathway, construction cost estimate, [Usage] • Evaluate a development pro forma for financial viability, identifying understated risk (vacancy, construction contingency) [Assessment]
Readings : [MilesBerensWeiss2007]	

Unit 5: Project Management and Construction Economics (8 hours)	
Competences Expected: AG-A05	
Topics	Learning Outcomes
• Project management phases: initiation, planning, execution, monitoring/controlling, close-out; work breakdown structure (WBS), Gantt charts, critical path method (CPM), • Cost estimation methods: order-of-magnitude, schematic, design development, and construction document estimates • Value engineering (VE) in architecture: function analysis, cost-performance trade-offs, life cycle costing • Risk management for architectural projects: identifying design risks (code compliance, constructability), professional liability risks (errors and omissions), • Construction specifications: MasterFormat divisions (CSI), section organization (part 1: general, part 2: products, part 3: execution) • Construction quality management: quality plans and inspection/test plans (ITPs) aligned with ISO 9001, non-conformance reports (NCRs) and corrective actions, and compilation of the quality dossier (material certifications, test reports, inspection records, as-built verification) for project close-out	• Describe the key project management activities for an architectural project: scheduling, cost estimating, value engineering, risk management, and quality management, [Familiarity] • Prepare a project schedule (Gantt chart) for a design project, linking deliverables to phases, and produce a schematic-level cost estimate using assembly-based unit costs [Usage] • Evaluate a project's budget and schedule performance against the baseline, using earned value management (EVM) metrics to identify cost or schedule overruns [Assessment]
Readings : [Hendrickson1998]	

8. WORKPLAN

8.1 Methodology

Individual and team participation is encouraged to present their ideas, motivating them with additional points in the different stages of the course evaluation.

8.2 Theory Sessions

The theory sessions are held in master classes with activities including active learning and roleplay to allow students to internalize the concepts.

8.3 Practical Sessions

The practical sessions are held in class where a series of exercises and/or practical concepts are developed through problem solving, problem solving, specific exercises and/or in application contexts.

9. EVALUATION SYSTEM

***** EVALUATION MISSING *****

10. BASIC BIBLIOGRAPHY