

Introduction to Capstone Project in Building Technology

Introduction to Capstone Project in Building Technology
(A concise, easy-to-read guide for students and professionals embarking on their final design research undertaking)

1. What Is a Capstone Project?

Aspect	Description
Definition	A culminating, integrative experience that requires students to apply theory, research, and technical skills to solve a real-world problem in building technology. - Demonstrate mastery of core competencies.
Purpose	- Bridge academic learning with industry practice. - Produce a deliverable (design, prototype, report, or simulation) that can be showcased to employers or stakeholders.
Typical Scope	3–6 months, 30–100% of final semester workload, often team-based (2–5 members).

2. Core Learning Outcomes

- Technical Proficiency** – Advanced knowledge of building systems (HVAC, structural, envelope, controls, sustainability).
 - Design & Analysis** – Ability to develop concept sketches, perform calculations, run simulations, and iterate designs.
 - Research Skills** – Conduct literature reviews, gather data, evaluate standards (ASHRAE, IECC, ISO).
 - Project Management** – Plan schedules, allocate resources, manage risk, and deliver on time.
 - Communication** – Write technical reports, create visual presentations, and defend findings to a panel.
 - Professional Ethics** – Consider safety, accessibility, environmental impact, and regulatory compliance.
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3. Typical Project Phases

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Phase	Key Activities	Deliverables
1. Project Initiation	- Identify a problem or opportunity. - Define objectives, scope, and success criteria. - Conduct a stakeholder analysis.	Project charter, problem statement, initial bibliography.
2. Literature Review & Benchmarking	- Survey current research, codes, and best practice case studies. - Compile data on comparable projects.	Annotated bibliography, gap analysis, reference matrix.
3. Concept Development	- Brainstorm solutions (sketches, flowcharts). - Select criteria for evaluation (cost, energy, durability). - Perform preliminary feasibility checks.	Concept diagrams, decision matrix, feasibility report.
4. Detailed Design & Analysis	- Create BIM/ CAD models. - Run simulations (energy, daylight, structural, CFD). - Conduct life-cycle cost and carbon analysis.	Final design drawings, simulation results, calculation sheets.
5. Prototyping / Pilot Testing <i>(optional)</i>	- Fabricate a scaled model or mockup. - Perform functional testing (thermal performance, sensor integration).	Test plan, test data, performance evaluation.
6. Documentation	- Write a comprehensive technical report (executive summary, methodology, results, discussion, recommendations). - Prepare appendices (code compliance tables, data logs).	Full project report (? 30–50 pages), supporting files.
7. Presentation & Defense	- Design slide deck or poster. - Practice oral defense, anticipate Q&A.	Oral presentation (15?20 min), poster, digital portfolio.
8. Reflection & Knowledge Transfer	- Document lessons learned. - Suggest future work or commercialization pathways.	Reflection essay, project hand-over package.

4. Choosing a Viable Topic

Consideration	Questions to Ask
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Relevance Does the topic address a current industry challenge (e