

Cross-Disciplinary Course Alignment:

Architecture, Construction Management, and Civil Engineering

Architecture

This Autodesk course content aligns well with graduate-level curricula in architecture, environmental design, and sustainable building sciences. Architectural design decisions influence both operational and embodied carbon emissions, and reducing these emissions is critical in addressing climate change. This course gives architecture students the tools and skills required for their sustainability goals during the conceptual design phase. At the end of this document are some **example course titles and course numbers** that this material might complement or be integrated into within schools of architecture and environmental sciences:

Construction Management (MS CM / Construction Engineering & Management)

Although the course is framed around early-stage design, its workflows map directly to construction planning, logistics, and risk management. Forma's **wind, noise, microclimate, and daylight** studies support safer site setups and more reliable sequencing—think crane siting with wind awareness (UTCI comfort), façade install windows, laydown areas outside high-noise zones, and public-facing mitigation during disruptive activities. Insight's **EnergyPlus-based** simulations and **Insight dashboards** translate into owner-driven performance targets (EUI, operational carbon) that CM teams can carry into **preconstruction estimates, buyout strategies, and GMP narratives**, while **embodied carbon mapping (via EC3)** informs low-carbon procurement and alternates. The **teaching supplements** and

ACC setup notes make it straightforward to bring these analyses into classroom team workflows and critiques.

Example student applications (CM):

- **Logistics & safety brief:** Use Forma wind maps and UTCI overlays to propose crane zones, hoist locations, and weather contingency windows for a multi-tower urban site; justify choices with data layers and comfort thresholds.
- **Noise-aware phasing:** Overlay Forma traffic-noise heat maps on the site to schedule high-impact tasks and define temporary barriers for adjacent streets and residential uses.
- **Carbon-informed alternates:** In Revit→Insight, compare envelope/system options in a custom dashboard (EUI + embodied carbon), and write a precon memo recommending a base bid and VE alternates that maintain performance targets.

Civil Engineering (MS CE / Civil & Environmental / Land Development)

For civil and site engineers, Forma's **context + environmental layers** enable earlier, evidence-based decisions about street canyons, pedestrian comfort, plaza usability, and noise exposure that shape ROW design, site circulation, and public-realm performance. Using the shared campus/mixed-use dataset (multi-building massing on a two-block site with varying heights and uses), CE students can study how tower placement, podium edges, and open-space configurations influence microclimate, comfort, and livability—inputs that typically drive grading, frontage design, and streetscape standards. When campus buildings are in scope, Revit→Insight workflows help quantify **operational** and **embodied** carbon for site-adjacent structures, supporting climate and resilience criteria in entitlement packages.

Example student applications (CE):

- **Public-realm comfort study:** Use Forma wind and daylight tools to refine plaza orientation and street section proportions, targeting comfortable walking/biking conditions and minimizing wind accelerations at corners.

- **Noise-sensitive frontage planning:** Map traffic-noise levels to adjust curbside programming (pick-up/drop-off, café seating, residential entries) and propose landscape/edge conditions as buffers.
- **Carbon-aware site structures:** For garages/podiums/retaining elements tied to the site, export to Insight and use **Embodied Carbon Details** to compare structural/material scenarios, documenting trade-offs with a dashboard.

What to Emphasize for Non-Architecture Audiences

1. **Outcome-based decisions, not just models.** Keep the emphasis on measurable outcomes (comfort, noise, energy, carbon) that inform CM phasing and CE public-realm performance. (Modules M2–M5.)
2. **Environmental conditions as constraints.** Position wind, noise, microclimate, and sun as constraints/opportunities that shape sequencing (CM) and section/edge design (CE). (Module 4.)
3. **Performance targets as contract language.** Use Insight's **EnergyPlus** results, **AIA 2030 DDx** export, and **embodied carbon via EC3** to define and track owner targets across alternates and VE. (Module 5.)
4. **Team workflows.** Leverage the provided **ACC/Revit/Forma classroom setup** to mirror how CM/CE collaborate with design teams. (Teaching supplements.)

Example course titles and course numbers:

Architecture Programs (M.Arch / MS in Architecture)

- **ARCH 652: Environmental Systems Integration**
- **ARCH 672: Performance-Based Design Studio**
- **ARCH 689: Outcome-Based BIM and Computational Design** (*revised title*)
- **ARCH 610: Building Performance Simulation** (*revised title*)
- **ARCH 675: Sustainable Design Strategies**

- **ARCH 674: Daylighting and Solar Access Analysis** (*new*)
- **ARCH 676: Environmental Noise and Soundscapes** (*new*)
- **ARCH 671: Urban Microclimate and Thermal Comfort** (*new*)
- **ARCH 679: Total Carbon in Architectural Design** (*new*)

Rationale: ties directly to M4 daylight/wind/noise/microclimate and M5 energy + embodied carbon workflows.

Environmental Design / Sustainability Programs

- **ENVS 540: Climate-Responsive Building Design**
- **ENVS 620: Data-Driven Environmental Systems**
- **SUST 601: Sustainable Urbanism and Resilient Cities**
- **ESCI 660: Energy Modeling for the Built Environment**
- **ESCI 645: Environmental Performance Tools and Methods** (*revised title*)
- **ENVS 635: Microclimate, Heat Islands, and Thermal Comfort** (*new*)
- **ENVS 645: Environmental Noise and Health in Cities** (*new*)
- **SUST 625: Life Cycle Assessment and Material Circularity** (*new*)
- **ESCI 665: Total Carbon Analysis for the Built Environment** (*new*)

Rationale: mirrors module emphases on climate/comfort analytics and total carbon.

Interdisciplinary or Technology-Focused Courses

- **DSGN 580: Digital Design Technologies for Sustainability**
- **BIM 601: Outcome-Based BIM and Performance Analytics** (*revised title*)
- **URBDP 535: GIS and Building Performance Simulation**
- **INTD 632: Integrated Design Technology and Analysis**

- **URBDP 536: Urban Microclimate Mapping and Pedestrian Comfort** (*new*)
- **DATA 610: Data Visualization and Dashboards for AEC Performance** (*new*)
- **CSCI 615: Computational Modeling for Environmental Systems** (*new*)
- **PLAN 630: Climate Risk and Scenario Planning** (*new*)

Rationale: supports cross-disciplinary use of Forma layers and Insight dashboards for evidence-based decisions.

Civil & Environmental / Land Development Programs (*added to extend reach*)

- **CIVL 640: Land Development Engineering**
- **CIVL 645: Site Planning and Grading**
- **CIVL 662: Urban Microclimate and Pedestrian Comfort**
- **CIVL 671: Environmental Noise and Mitigation**
- **CIVL 688: BIM and Digital Delivery for Civil Infrastructure**
- **ENVE 621: Life Cycle Assessment for Infrastructure Materials**
- **ENVE 630: Environmental Impact Assessment and Modeling**
- **ENVE 655: Climate Resilience for Urban Infrastructure**
- **LDEV 601: Land Use Planning and Development Feasibility**
- **LDEV 655: Public Realm Design and Streetscape Performance**

Rationale: the two-block mixed-use dataset and Forma's wind/noise/daylight layers map cleanly to frontage, plaza, and ROW performance decisions in CE/Land Development.

Construction Management / Construction Engineering & Management (*added to extend reach*)

- **CEM 611: Preconstruction and Carbon-Informed Estimating**

- **CEM 630: Construction Logistics and Site Environmental Management**
- **CEM 635: VDC/BIM for Construction Planning and Phasing**
- **CEM 642: Lean Construction and Performance Targets**
- **CEM 650: Sustainable Construction Methods and Materials**
- **CEM 655: Energy and Carbon Targets in Construction Delivery**

Rationale: Forma microclimate/noise for safety & logistics; Insight EUI and embodied carbon for target-driven buyout/VE.