

An Integrative Curriculum in Architectural Engineering Technology

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Abstract

In an effort to improve the Architectural Engineering Technology curriculum at the University of Hartford, educators and practitioners are working in collaboration. As design professionals, we are approaching the challenges of an integrative curriculum as we would an architectural design project. The goals of the 'new' design curriculum are to improve student learning through effective implementation of practice. The curriculum promotes critical thinking, problem solving skills, and creativity. Realistic issues are integrated into the design studios – real programs, real sites, cost estimating, and scheduling. We are integrating 'the basics' – architectural history, architectural theory, drawing, and technical courses (such as structures and environmental systems) with design. In the design studio courses, we are attempting to find balance and connection, and increase the awareness of the interrelationships between these areas of study for the students. Faculty, practitioners, and students know that learning in a compartmental fashion has never been that successful. We look towards this new integrative design studio approach as a better way to prepare our students for the demands of professional life.

I. Issues in Architectural Education

Throughout history, what has distinguished 'architecture' from the mere building of buildings is the insight and skill to blend the useful with the timeless, the technically sound, with the beautiful. The challenge that has always faced both the academy and the profession has been discovering the right balance of Vitruvius' ancient ideals, Firmness, Commodity, and Delight. That challenge continues today.¹

In his "The State of the Profession" report, Hugh Hochberg of the Coxe Group, Inc. recognized the challenges presented to the architectural profession. Hochberg challenged the academy to help students understand more about the real world in which they will be practicing (while also recognizing that with some of their skills they may help shape it differently).²

The Carnegie report on "Building Community: A New Future for Architecture Education and Practice" (1996) by the late Ernest L. Boyer and Lee D. Mitgang is a comprehensive report on the state of Architectural education with goals for improvement. The report criticized architecture programs for lack of integration of the curriculum. Boyer noted, that many design studios seem not to be living up to their expectations.³

In the Carnegie report, Boyer and Mitgang challenged the architectural community to provide "Service to the Nation". Schools of architecture, in other words, should educate students for both competence and caring. The architecture profession demands service of its constituents and requires architectural interns to provide community service through the Intern Development Program (IDP), a prerequisite to licensure throughout the United States and Canada. In this same report, Boyer and Mitgang also stress that the world of architecture practice and education depend on each other for their purpose and vitality. These two sides of the profession also share an obligation to serve the needs of the community, the built environment and society.⁴

II. Revised Program Curriculum

Initially our design sequence was fractured and non-continuous. In an eight semester program we had design studio courses only in the first, third, fifth and sixth semesters. In the final semester, we offered a thesis studio for our architectural graduate school bound seniors.

Initial Design Sequence in Context: 1998-1999 AET Curriculum

Sem 1	Course	Credits	Sem 2	Course	Credits
AET 110	Architectural Drafting	3	AET 122	Intro to Arch CAD	4
AET 113	Intro to Arch Studio	4	AET 155	Architectural History	4
ET 111	Intro to Engrg Tech	1	MTH 122	Math for Tech II	3
MTH 112	Math for Tech I	3	PHY 121	Algebra-based Physics II	4
PHY 120	Algebra-based Physics I	4			
Sem 3	Course	Credits	Sem 4	Course	Credits
AET 232	Working Drawings I	4	AET 241	Principles of M E P	4
AET 233	Arch Design I	4	AET 242	Working Drawings II	4
AET 236	Mechanics of Materials	4	AET 243	Structural Analysis	4
EN 111	English I	3	MTH 241	Math for Tech IV	3
MTH 232	Math for Tech III	3			
Sem 5	Course	Credits	Sem 6	Course	Credits
AET 351	Design Steel & Wood	4	AET 361	Design of Concrete Strt	4
AET 352	Arch Design II	4	AET 367	Commercial Design	4
AUC 1	All Univ Curr Elective	3	EN 241	English II	3
HSS 1	Social Sci Elective	3	AUC 2	All Univ Curr Elective	3
PROF 1	Professional Elective	3	PROF 2	Professional Elective	3
Sem 7	Course	Credits	Sem 8	Course	Credits
AUC 3	All Univ Curr Elective	3	EN 481	English III	3
PROF 3	Professional Elective	3	AUC 4	All Univ Curr Elective	3
PROF 4	Professional Elective	3	FREE 1	Unrestricted Elective	3
SCI 1	Basic Lab Science	4	PROF 5	Professional Elective	3
TECH 1	Technical Specialty	4	TECH 2	Technical Specialty or	4
			AET 489	Senior Design Thesis	5

Our revised curriculum provides continuity with a studio course in all eight semester. In the first semester, we provide an introductory design studio class, which is followed by Architectural Design I – V. In semesters 7 and 8 students are encouraged to take our Architectural Programming class followed by the Senior Design Thesis class, which are both organized in the studio format.

Revised Design Sequence in Context: 2000-2001 AET Curriculum

Sem 1	Course	Credits	Sem 2	Course	Credits
AET 110	Intro to Architecture	4	AET 113	Arch Design I	4
AET 155	Architectural History I	4	AET 156	Architectural History II	4
EN 111	English I	3	PHY 120	Algebra-based Physics I	4
ET 111	Intro to Engrg Tech	1	MTH 122	Math for Tech II	3
MTH 112	Math for Tec I	3			
Sem 3	Course	Credits	Sem 4	Course	Credits
AET 232	Working Drawings I	4	AET 241	Principles of M E P	4
AET 233	Arch Design II	4	AET 242	Working Drawings II	4
MTH 232	Math for Tech III	3	AET 244	Arch Design III	4
PHY 121	Algebra-based Physics II	4	MTH 241	Math for Tech IV	3
Sem 5	Course	Credits	Sem 6	Course	Credits
AET 236	Mechanics of Materials	4	AET 243	Structural Analysis	4
AET 352	Arch Design IV	4	AET 367	Arch Design V	4
AUC 1	All Univ Curr Elective	3	EN 241	English II	3
HSS 1	Social Sci Elective	3	AUC 2	All Univ Curr Elective	3
TECH 1	Technical Specialty	4	TECH 2	Technical Specialty	3
Sem 7	Course	Credits	Sem 8	Course	Credits
AET 351	Design of Steel Strt	4	AET 361	Design of Concrete Strt	4
EN 481	English III	3	AUC 4	All Univ Curr Elective	3
AUC 3	All Univ Curr Elective	3	PROF 2	Professional Elective	3
SCI 1	Basic Lab Science	4	PROF 3	Professional Elective	3
PROF 1	Professional Elective or	3	TECH 3	Technical Specialty or	4
AET 470	Arch Programming	3	AET 489	Senior Design Thesis	5

III. Design Education

The uniqueness of an architect's education lies in its combination of theory and technology courses in the lecture/seminar format with the design studio. The studio provides opportunities for exploration, questioning, testing, and criticism. It encourages the search for individual response while requiring interaction with faculty, other students, and outside critics. It requires the student to bring in experience and knowledge gained in other courses. It demands personal accountability for decisions and commitment to ideas and proposals that will be subject to public scrutiny.⁵

At the University of Hartford's Ward College AET program:

- Design is introduced early in the program and integrated throughout the curriculum. Every semester has a design studio course.
- Increased exposure to practice is provided through industry-in-the-classroom activities.
- Increased emphasis is placed on communication, both oral and written. Requirements are integrated throughout the curriculum.

At the University of Hartford, students are often challenged with "real" projects. When possible proposed sites are accessible for student visits. Students present their solutions and are critiqued by their peers, faculty, local professionals, and invited guests. Other members of the College and University community are present as well in a successful effort to integrate more fully the architecture program into the greater University environment. Comments, positive and sometimes negative, are in the form of oral communication and critic sheets. Although reviews may be stressful, they are a wonderful chance to experience 'real life' and have often led to employment opportunities for our students.

IV. Revised Design Curriculum

The design studio has traditionally been the hallmark of architectural education, the place for integrative learning to take place. Schools throughout the country have been criticized for not living up to their goals. At the University of Hartford we have been challenged by this criticism and in response have redeveloped our design studio curriculum.

AET 110	Intro to Architecture	4 Credits	8 Contact Hours / Week
AET 113	Architectural Design I	4 Credits	8 Contact Hours / Week
AET 233	Architectural Design II	4 Credits	8 Contact Hours / Week
AET 244	Architectural Design III	4 Credits	8 Contact Hours / Week
AET 352	Architectural Design IV	4 Credits	8 Contact Hours / Week
AET 367	Architectural Design V	4 Credits	8 Contact Hours / Week
AET 470	Architectural Programming	3 Credits	3 Contact Hours / Week*
AET 489	Architectural Thesis	5 Credits	10 Contact Hours / Week*

* Architectural Programming and Architectural Thesis are both elective courses.

The knowledge introduced and the skills developed in these classes include:

- *Critical thinking* – using knowledge base to evaluate design solutions;
- *Problem solving* – the ability to research, assimilate and synthesize a given problem and develop appropriate solutions;
- *Creativity* – thinking beyond the ordinary and given path; to use your background and personal interpretation to put things together in new ways;
- *History, Theory* – through lectures and exercises to explore precedence and understand the ideas behind the precedence;
- *Drawing* – further develop the eye-hand connection and explore multiple ways to express your ideas graphically

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- *Design* – the process of coalescing the above five skills.

Introduction to Architecture: AET 110

Course Description: This course focuses on integrating lectures and studio classes to develop the students' understanding of the methods, media and materials used in communication of design. Students will practice graphic and verbal presentation techniques. Construction techniques in relation to construction documents: plans, elevations, sections, details and specifications will be presented.

Course Integrations:

Architectural Design	Working Drawings
Architectural Drawing	Technical Writing and Communication
Architectural History	

Design I: AET 113

Course Description: An introductory course with an emphasis on the architectural responses to people's basic need for shelter. At the fundamental level, these needs, physical, psychological, sensual, intellectual, cultural and aesthetic, are met through physical design. The course has an emphasis on traditional and non-traditional, two and three-dimensional studio techniques, tools and media. Emphasis is placed on problem solving through the studio activity, related architectural theory and criticism

Course Integrations:

Architectural Design	Abstract Composition
Architectural Drawing	Model Making
Architectural History	Sketching
Working Drawings	Architectural Rendering
Technical Writing and Communication	Psychology

Design II: AET 233

Course Description: This course focuses on the design of small buildings with emphasis on schematic and presentation drawings and model building. The course will explore the analysis and synthesis of architectural form generated by program requirements, physical systems, spatial organization, available technologies and review of historical precedents and aesthetics.

Course Integrations:

Architectural Design	Sketching
Architectural Drawing	Architectural Rendering
Architectural History	Psychology
Working Drawings	Site Planning
Technical Writing and Communication	Master Planning
Abstract Composition	Interior Design
Model Making	

Design III: AET 244

Course Description: An architectural design studio course with a focus on preliminary design, schematic design and design development of an institutional building. Emphasis will be placed on developing the students' ability to research, analyze and evaluate

information as the design evolves. Students will prepare a major institutional project for review by visiting professionals and faculty.

Course Integrations:

Architectural Design	Site Planning
Architectural Drawing	Master Planning
Architectural History	Interior Design
Working Drawings	Estimating
Technical Writing and Communication	Structural Engineering
Abstract Composition	Mechanical Engineering
Model Making	Electrical Engineering
Sketching	Plumbing Engineering
Architectural Rendering	Civil Engineering
Psychology	

Design IV: AET 352

Course Description: An architectural design studio course with a focus on design of buildings, with an increased complexity and scale, in a contextual setting. A systematic site and environmental analysis and design of a preliminary master plan will be followed by an architectural project exploring the formal and informal fundamentals of design.

Course Integrations:

Architectural Design	Site Planning
Architectural Drawing	Master Planning
Architectural History	Interior Design
Working Drawings	Estimating
Technical Writing and Communication	Structural Engineering
Abstract Composition	Mechanical Engineering
Model Making	Electrical Engineering
Sketching	Plumbing Engineering
Architectural Rendering	Civil Engineering
Psychology	

Design V: AET 367

Course Description: This course is an architectural design studio course with a focus on schematic design, design development and construction documents, including selected details of a commercial building. Emphasis will be in developing the students' ability to select, apply and evaluate materials and construction techniques for a design project based on the integration of the elements of architectural design, structures and environmental systems, design factors, cost, specifications and code applicability.

Course Integrations:

Architectural Design	Sketching
Architectural Drawing	Architectural Rendering
Architectural History	Psychology
Working Drawings	Site Planning
Technical Writing and Communication	Master Planning
Abstract Composition	Interior Design
Model Making	Estimating

Structural Engineering
 Mechanical Engineering
 Electrical Engineering

Plumbing Engineering
 Civil Engineering

V. Conclusions

Architecture curriculum is by nature connected. According to Boyer and Mitgang, our most distinctive feature is the design studio, which is a model for the integration and application of learning⁶. A model that many other disciplines on campus could well profit from observing. The University of Hartford's Architectural Engineering Technology curriculum is based on the blending of academic based theoretical studies with industry based problem-solving activities. Integral to accomplishing these educational goals is the participation of local industrial leaders in the curriculum development process. Preparing students for a lifetime of professional contribution is the responsibility of both the universities and the profession. The University of Hartford takes great steps to create avenues of more open and sustained dialogue and fully acknowledges the shared goals and responsibilities of educators and practitioners. By redefining the boundaries between education and practice, mutual respect is developing and the goal of an integrated education model is met. However, most importantly, our studio-trained graduates are finding a flattering reflection of their educational experience in the integration-rich workplace.

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