



# CLIMATE | STRUCTURE | ENCLOSURE

## Architectural Technology in Context

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ARCH/IAPD 248  
Fall 2014  
MWF 9:30A-10:20A  
Seaton Hall 063

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### Course Intent and Learning Goals

Architectural technology is often, mistakenly, viewed as something separate and apart from architectural design. This course is an attempt to correct this unfortunate misconception by offering you an introduction to architectural technology within the broad context of architecture itself. In this context, technology is viewed as integral to the conception and realization of design intentions. Although architectural technology is the primary focus of this course, it is but one of what Scott Drake calls the “dimensions of built space”, which also include the aesthetic and social dimensions. My overarching intent, then, in teaching this course is for you to begin to develop a sense of, and appreciation for, the interconnectedness of these dimensions.

Specifically, this course will:

- provide a general introduction to all of the various aspects of architectural technology, including environmental design and control, structures, and materials and methods of construction.
- provide a framework for students to situate content from advanced technical coursework.
- foster the transfer of technical knowledge to the design studio.

So, by the end of this course, you will understand architectural technology’s core concepts and principles within the broad context of the architectural discipline and will be capable of applying these concepts and principles within the design studio.

## Course Structure

The course is organized into three modules: CLIMATE, STRUCTURE, and ENCLOSURE. This is most obviously a topical organization in that it moves from such considerations as the relationship between climate characteristics and architectural strategies to the spatial implications of various structural systems to the role of the building enclosure as the interface between the interior and the exterior. What may not be as obvious is that the course also follows a sequential organization moving from exterior and large-scale to interior and small-scale considerations. Within each module, conceptual approaches and design themes provide context for the technical information that you would expect in a course on architectural technology.

	<b>CLIMATE</b>	<b>STRUCTURE</b>	<b>ENCLOSURE</b>
<b>Conceptual Approaches</b>	<ul style="list-style-type: none"><li>• Selective vs. Exclusive Environmental Approaches</li><li>• Adaptive Comfort</li></ul>	<ul style="list-style-type: none"><li>• Exposed vs. Hidden Structure</li><li>• Solid vs. Filigree Construction</li></ul>	<ul style="list-style-type: none"><li>• Loadbearing Structure vs. Enclosure</li><li>• Enclosure as Interface with Exterior</li></ul>
<b>Design Themes</b>	<ul style="list-style-type: none"><li>• Climate-adaptive Architectural Strategies</li></ul>	<ul style="list-style-type: none"><li>• Enclosing Space</li></ul>	<ul style="list-style-type: none"><li>• Adaptive Enclosures</li><li>• The Integrated Enclosure</li></ul>
<b>Technical Information</b>	<ul style="list-style-type: none"><li>• Climate Characteristics</li><li>• Comfort Zone</li></ul>	<ul style="list-style-type: none"><li>• Solid, Slab, and Skeleton Construction</li><li>• Loadbearing Behavior</li><li>• Framing Systems</li></ul>	<ul style="list-style-type: none"><li>• Assembly Tightness and Permeability</li><li>• Detailing and Tolerances</li><li>• Regulating Comfort</li></ul>

## Assignments and Grading

### Readings and Lectures

I will deliver a lecture each Wednesday and Friday (and sometimes on Monday). Each lecture will reinforce and build upon the required readings for that day. Success in this course begins by coming prepared for class, which means reading the readings prior to the day's lecture. If you do so, your overall comprehension of the material will improve considerably and you will be far better prepared for the quizzes and tests than you would be by simply attending the lectures.

### Activities

Six times throughout the semester, I will ask you to complete an activity that reinforces key themes from the day, the week, or the module. You will at least start, if not complete and review, these activities during the class in which they were issued. Your active participation is what is primarily required as these assignments will be graded on a pass/no pass basis. These activities can only be made up if you have an excused absence. As the instructor, I have sole discretion over what constitutes an excused absence. A word of advice, it is better to seek permission than forgiveness, although unforeseen circumstances occur and will be given due consideration.

### Exercises

You will complete a four-part case study of a work of architecture throughout the semester in teams of two. There is one exercise associated with each of the three modules plus one exercise at the end of the semester intended to tie all of the exercises together. Each exercise provides an opportunity for you to apply your knowledge and understanding of course material within an architectural design context. I encourage you to consider how these lessons can be applied to your next architectural design project. While a more extensive description will be posted to K-State Online, the following will give you some sense of each exercise's objectives.

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#### **1: CLIMATE**

Describe the climate characteristics. Use *Climate Consultant* to generate climatic data and manipulate the psychrometric chart to expand the comfort zone using applicable design strategies. List what you consider to be the three most important design strategies and explain your reasoning.

#### **2: STRUCTURE**

Determine your case study project's space-enclosing construction and the horizontal and vertical relations between the primary spaces, and support your conclusions with annotated diagrams.

#### **3: ENCLOSURE**

Analyze the effectiveness of your case study project's southern facade in regard to solar shading. Address any shortcomings by either making adjustments to or designing a south-facing exterior shading device appropriate for the case study project's building type and climate.

#### **4: INTEGRATION**

Determine your case study project's mode of environmental control using Dean Hawkes's "General Characteristics of Exclusive and Selective Mode Buildings" and his "Global Characteristics of Selective Design" as evaluative criteria. Compile all four exercises into a comprehensive, final submittal.

#### **Revisions**

You may revise previously submitted and graded exercises to receive up to 5 points (one full letter grade increase) for each revised exercise. You should respond directly to the issues mentioned in the grading rubric, asking for clarification if needed. You must also document the changes you have made to facilitate regrading by creating a summary sheet which outlines the changes made and where they can be found in the exercise. All revisions must be completed and turned-in along with Exercise 4: INTEGRATION, but can be turned-in earlier.

#### **Quizzes**

The quizzes should encourage you to keep pace with the required readings, and attend and take notes at all the lectures. They will also help you to prepare for the tests given that the questions will be similar. I will give six quizzes, two per module, consisting of ten multiple-choice questions with each worth two points. The quizzes will be administered online, must be taken individually, and will be open book/open notes. Despite this last fact, you should still prepare, as you will have a limited amount of time to complete each quiz. If you read the required readings, attend and take notes during the lectures, and review your notes prior to the quiz, you should be well prepared. All quiz questions will be drawn from the required readings and may or may not be covered in the lectures.

#### **Tests**

As the point totals below clearly indicate, the tests are the main vehicle for assessing your knowledge and understanding of course material. Again, I cannot stress enough how important it is that you keep pace with the required readings, and attend and take notes at all the lectures. I will give a test at the end of each module for a total of three. Each test will consist of fifty multiple-choice questions with each worth two points. The tests will be administered online, must be taken individually, and will be open book/open notes. Despite this last fact, you should still prepare, as you will have a limited amount of time to complete each test. If you read the required readings, attend and take notes during the lectures, and review your notes prior to the test, you should be well prepared. All test questions will be drawn from the required readings and may or may not be covered in the lectures.

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<b>Activities (6 @ 10 pts each)</b>	<b>60 points</b>	<b>(9%)</b>
<b>Exercises (4 @ 50 pts each)</b>	<b>200 points</b>	<b>(29%)</b>
<b>Quizzes (6 @ 20 pts each)</b>	<b>120 points</b>	<b>(18%)</b>
<b>Tests (3 @ 100 pts each)</b>	<b>300 points</b>	<b>(44%)</b>
<b>Total</b>	<b>680 points</b>	<b>(100%)</b>

Late work without an excused absence approved by me will be reduced one full letter grade.

Please address any issues you may have regarding a grade within two weeks of receiving the grade.

If you earn an overall course grade within .5% of the next highest letter grade, I will round it to the next highest letter grade.

## Texts, Readings, and References

(All of the following texts are on reserve in Weigel Library. The required readings are drawn from these texts and are identified in the schedule by the first authors' last name.)

### Required Text

Dahl, Torben. *Climate and Architecture*. 1st ed. Routledge, 2009.

Available at online booksellers and in hard copy at the K-State Bookstore.

### Required Selected Readings

(Although you are not required to purchase these texts, selected readings drawn from each of the following are required, and are available for download in pdf format from the course website on K-State Online.)

Brownell, Blaine. *Material Strategies*. Princeton Architectural Press, 2011.

Ching, Francis D. K. *Building Construction Illustrated*. 4th ed. Wiley, 2008.

Ching, Francis D. K. *Building Structures Illustrated: Patterns, Systems, and Design*. Wiley, 2009.

Deplazes, Andrea. *Constructing Architecture: Materials, Processes, Structures*. 2nd ed. Birkhäuser Architecture, 2008.

Drake, Scott. *The Elements of Architecture: Principles of Environmental Performance in Buildings*. Earthscan Publications Ltd., 2009.

Hawkes, Dean. *The Environmental Tradition: Studies in the Architecture of Environment*. Taylor & Francis, 1996.

Hawkes, Dean, Wayne Forster, and Arup Associates. *Architecture, Engineering and Environment*. London: Laurence King Pub. in association with Arup, 2002.

Hawkes, Dean, Jane McDonald, and Koen Steemers. *The Selective Environment: An Approach to Environmentally Responsive Architecture*. London; New York: Spon Press, 2002.

Knaack, Ulrich, Tillmann Klein, Marcel Bilow, and Thomas Auer. *Facades: Principles of Construction*. 1st ed. Birkhäuser Architecture, 2007.

Lechner, Norbert. *Heating, Cooling, Lighting: Sustainable Design Methods for Architects*. 3rd ed. Wiley, 2009.

Lstiburek, Joseph. "Insight: The Perfect Wall". Building Science Corporation, July 2010. <http://www.buildingscience.com/documents/insights/bsi-001-the-perfect-wall?topic=doctypes/insights>.

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McDonald, Angus J. *Structure and Architecture*. 2nd ed. Architectural Press, 2001.

Meijs, Maarten, and Ulrich Knaack. *Components and Connections: Principles of Construction*. 1st ed. Birkhäuser Architecture, 2009.

Sandaker, Bjorn N., Arne P. Eggen, and Mark R. Cruvellier. *The Structural Basis of Architecture*. 2nd ed. Routledge, 2011.

Smith, David Lee. *Environmental Issues for Architecture*. Wiley, 2011.

### **Recommended Selected References**

Allen, Edward, and Joseph Iano. *The Architect's Studio Companion: Rules of Thumb for Preliminary Design*. 5th ed. Wiley, 2011.

Bell, Victoria Ballard, and Patrick Rand. *Materials for Design*. Princeton Architectural Press, 2006.

Bell, Victoria Ballard, and Patrick Rand. *Materials for Design 2*. Princeton Architectural Press, 2014.

DeKay, Mark, and G. Z. Brown. *Sun, Wind & Light: Architectural Design Strategies*. 3rd ed. Wiley, 2014.

Kwok, Alison G., and Walter T. Grondzik. *The Green Studio Handbook: Environmental Strategies for Schematic Design*. 2nd ed. Oxford; Burlington, MA: Architectural Press, 2011.

Silver, Pete, and William McLean. *Introduction to Architectural Technology*. 2nd ed. London: Laurence King Publishing, 2013.

Watts, Andrew. *Modern Construction Handbook*. 3rd ed. Vienna, Austria: Springer-Verlag, 2013.

Weston, Richard. *Materials, Form and Architecture*. New Haven, CT: Yale University Press, 2003.

## **Statements and Policies**

### **Intellectual Property Policy**

Student academic creations are subject to Kansas State University and Kansas Board of Regents (BOR) Intellectual Property Policies. The BOR policy states:

"The ownership of student works submitted in fulfillment of academic requirements shall be with the creator(s). The student, by enrolling in the institution, gives the institution a non-exclusive royalty-free license to mark on, modify, retain the work as may be required by the process of instruction, or otherwise handle the work as set out in the institution's Intellectual Property Policy or in the course syllabus. The institution shall not have the right to use work in any other manner without the written consent of the creator(s)."

"Otherwise handle," as referenced in the BOR Intellectual Property Policy, includes display of student work in various media and use for accreditation purposes. The Kansas State University Intellectual Property Policy can be found at: <http://www.ksu.edu/academic/services/intprop/policies.htm>.

### **Departmental Policy for Retention of Student Work**

A student's projects, assignments, presentations and models may be retained by his or her instructor for display, use in teaching, course records, accreditation documentation, or other academic or pedagogical purposes. Students will, however, be permitted to photograph or otherwise record/copy any work retained by the faculty.

## **Academic Honesty**

Kansas State University has an Honor System based on personal integrity, which is presumed to be sufficient assurance in academic matters one's work is performed honestly and without unauthorized assistance. Undergraduate and graduate students, by registration, acknowledge the jurisdiction of the Honor System. The policies and procedures of the Honor System apply to all full and part-time students enrolled in undergraduate and graduate courses on-campus, off-campus, and via distance learning. The honor system website can be reached via the following URL: [www.ksu.edu/honor](http://www.ksu.edu/honor).

A component vital to the Honor System is the inclusion of the Honor Pledge, which applies to all assignments, examinations, or other course work undertaken by students. The Honor Pledge is implied, whether or not it is stated: "On my honor, as a student, I have neither given nor received unauthorized aid on this academic work." A grade of XF can result from a breach of academic honesty. The F indicates failure in the course; the X indicates the reason is an Honor Pledge violation.

## **Students with Disabilities**

Students with disabilities who need classroom accommodations, access to technology, or information about emergency building/campus evacuation processes should contact the Student Access Center and/or their instructor. Services are available to students with a wide range of disabilities including, but not limited to, physical disabilities, medical conditions, learning disabilities, attention deficit disorder, depression, and anxiety. If you are a student enrolled in campus/online courses through the Manhattan or Olathe campuses, contact the Student Access Center at [accesscenter@k-state.edu](mailto:accesscenter@k-state.edu), 785-532-6441.

## **Expectations for Classroom Conduct**

All student activities in the University, including this course, are governed by the [Student Judicial Conduct Code](#) as outlined in the Student Governing Association [By Laws](#), Article V, Section 3, number 2. Students who engage in behavior that disrupts the learning environment may be asked to leave the class.

## **Campus Safety**

Kansas State University is committed to providing a safe teaching and learning environment for student and faculty members. In order to enhance your safety in the unlikely case of a campus emergency make sure that you know where and how to quickly exit your classroom and how to follow any emergency directives. To view additional campus emergency information go to the University's main page, [www.k-state.edu](http://www.k-state.edu), and click on the Emergency Information button.

## **Academic Freedom**

Kansas State University is a community of students, faculty, and staff who work together to discover new knowledge, create new ideas, and share the results of their scholarly inquiry with the wider public. Although new ideas or research results may be controversial or challenge established views, the health and growth of any society requires frank intellectual exchange. Academic freedom protects this type of free exchange and is thus essential to any university's mission.

Moreover, academic freedom supports collaborative work in the pursuit of truth and the dissemination of knowledge in an environment of inquiry, respectful debate, and professionalism. Academic freedom is not limited to the classroom or to scientific and scholarly research, but extends to the life of the university as well as to larger social and political questions. It is the right and responsibility of the university community to engage with such issues.

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