

USC School of Architecture

PRELIMINARY

(in-progress, last updated 11/12/2024)

Architecture 517: Special Topics - Theories of Computer Technology

Spring Semester, Units: 1 – class meets until February 20, 2024.

Thursdays: 9 am – 11:50 am, LVL 3C – this is in Leavey Library

Instructor: Karen Kensek

Office: Watt 309

Office Hours: send email for appointment, live or Zoom; happy to talk with you!

Contact Info: kensek@usc.edu

Class Assistant: TBA

Office Hours: TBA

Contact Info: TBA

A computer-aided design system is most useful when the structured design inside the computer can be used for something besides merely producing a picture. As soon as the process of computer-aided design is considered as building a description of the object being designed rather than as a process of simply drawing the object, horizons become tremendously expanded.

Ivan E. Sutherland (1973)

What remains hard is modeling. The structure inherent in three-dimensional models is difficult for people to grasp and difficult too for user interfaces to reveal and manipulate. Only the determined model three-dimensional objects, and they rarely invent a shape at the computer, but only record a shape so that analysis or manufacturing can proceed. The grand challenges to three-dimensional graphics are to make simple modeling easy and make complex modeling accessible to far more people.

Robert Sproull (keynote speech, SIGGRAPH 1990)



Michelle Ramierez, Arch 517, Spring 2024, homework 3



Course Description and Learning Objectives

Architecture 517 is a one unit course that meets once a week for three hours for six weeks. Arch 517 is based on the key parts of Arch 507 using Revit to create and document a building. The courses will focus on the quote from Ivan E. Sutherland. Essentially what Sutherland was proposing is a system similar to a fairly recent development in computer software called building information modeling (BIM). By combining 3d geometry with data into parametric components, it changes not only how buildings are described digitally, but the processes in an office to design, document, and eventually construct buildings. Learn what it is, how to apply it, innovative uses, and how it relates to the current state of work processes in the AEC profession.

In order to effectively learn about BIM, it is important that you go to class and keep up with the required readings. You are required to attend all the lectures and complete all the assignments on-time. In addition to many hands-on computer sessions by the instructor, there will also be guest lecturers from the profession. They have spent considerable time and effort to come talk with the class. Listen, be attentive, and ask appropriate questions. They are valuable resources.

In this class, you will

- Learn what BIM is and how it has changed the AEC industry
- Learn the difference between Revit and Rhino
- Become reasonably proficient in Revit Architecture
- Explore other BIM related software programs such as Navisworks Manage depending on class time

Prerequisite(s): upper division standing or graduate student

Co-Requisite (s): none

Recommended Preparation: basic understanding of 2D CAD and 3D digital modeling. Although this course is offered in the School of Architecture, the techniques taught are equally applicable to others with an interest in the applications of building information modeling. Building science majors, structural engineering students, construction management students, and others are strongly encouraged to enroll. Please contact the instructor if you have questions.

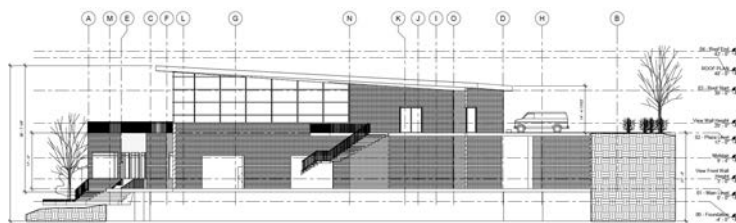
Software Required

A USC email and Autodesk accounts are required for this course. Verify that your USC account and Brightspace are working. Call 1-213-740-5555 if you have problems accessing your account. You will also need an **Autodesk account** to download software: students.autodesk.com.

Download **Autodesk Revit 2025** from <http://students.autodesk.com>. Also download the Revit content libraries. <https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/sfdcarticles/sfdcarticles/Where-to-find-Revit-Content-Libraries-to-download.html>

There is more information about downloading Revit and the content libraries on the last page of the syllabus.

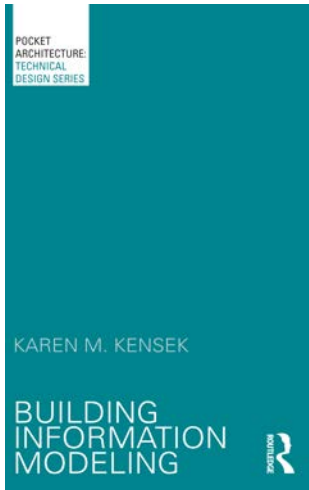
Contact Dipak if you have problems (dshirke@usc.edu). These software programs are also available on computers in the University labs and in the School of Architecture. Revit only runs under Windows. You can also access them through the USC Cloud Apps on a Macintosh, but it is a bit annoying. <https://itservices.usc.edu/vdi/>



Josh Hunsucker, Arch 517, Spring 2024, homework 3

Required Readings and Supplementary Materials

Specific due dates for the readings are listed on the syllabus. You are required to have read the material **before** class. There may be in-class quizzes on the readings. There will be other readings posted on Blackboard or put on reserve in the AFA library as necessary. Books may be available at other locations (e.g. amazon.com).



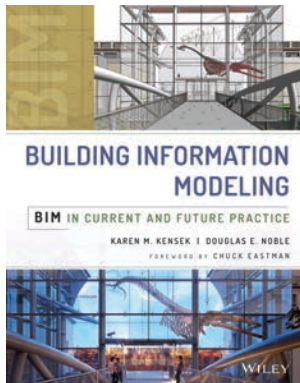
Required – Arch 507 and 517 students should buy immediately

Technical Design Series: Building Information Modeling

Karen M. Kensek, LEED AP BD+C, Assoc. AIA

<http://www.routledge.com/books/details/9780415717748>

Introduction
Chapter 1: BIM Overview
Chapter 2: Stakeholders and BIM's Many Roles
Chapter 3: Data Exchange and Interoperability
Chapter 4: BIM Implementation
Chapter 5: Beyond Basic BIM
Application: Project Case Studies
Conclusion



Optional

Building Information Modeling: BIM in Current and Future Practice

Editor: Karen M. Kensek, LEED AP BD+C, DPACSA
Editor: Douglas E. Noble, PhD, FAIA

<http://www.wiley.com/WileyCDA/WileyTitle/productCd-111876630X.html>

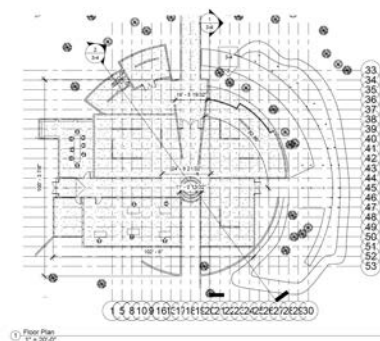
Each chapter is a stand-alone topic on research areas in BIM. I recommend looking at the table of contents and reading about those areas that interest you the most.

Required Reference Documents on Brightspace

There are many files on Brightspace including the syllabus, homework assignments, and readings. Please download all of them.



David Crawford, Arch 517, Spring 2024, homework 3



Optional readings on Brightspace

aiab095712 - AIA BIM contract documents.pdf
National Building Information Modeling Standard (NBIMSv1_p1.pdf)
AECbytes -Got Macros.pdf (on Blackboard)

Optional References On-Line (cut and paste the links)

LinkedIn Learning

Accessible from Blackboard; hundreds of useful courses. Try searching under Revit or Dynamo.

Interesting blogs about BIM and Revit

Marcello Sgambelluri - <http://therevitcomplex.blogspot.com/>
<http://therevitcomplex.blogspot.com/2012/07/creating-walls-that-follow-site.html>
Phil Lazarus - <http://bimtroublemaker.blogspot.com/>
Zach Kron - <http://buildz.blogspot.com/>
LA RUG (Revit User Group) - <http://losangelesrevitusersgroup.blogspot.com/>
Jeremy Tammik - <http://thebuildingcoder.typepad.com/blog/>

Autodesk

Glenn Katz - <http://www.bimtopia.com/>
<https://www.autodesk.com/certification/overview>
<http://students.autodesk.com/>
<https://www.revitcity.com/downloads.php>
<http://www.augi.com>

Interoperability

Rhino.Inside.Revit - <https://www.rhino3d.com/inside/revit/1.0/>
Exchange Connector Rhino/Revit - <https://blogs.autodesk.com/revit/2022/09/22/data-exchange-connector-for-mcneel-rhino-now-in-public-beta/>
Proving Ground Conveyor – <https://provingground.io/tools/conveyor/>
Speckle - <https://speckle.systems/>
Marcello Sgambelluri - <https://www.aeccheatsheets.com/downloads>

Attendance

The University of Southern California recognizes the diversity of our community and the potential for conflicts involving academic activities and personal religious observation. The University provides a guide to such observances for reference and suggests that any concerns about lack of attendance or inability to participate fully in the course activity be fully aired at the start of the term. As a general principle, students should be excused from class for these events if properly documented and if provisions can be made to accommodate the absence and make up the lost work. Constraints on participation that conflict with adequate participation in the course and cannot be resolved to the satisfaction of the faculty and the student need to be identified prior to the drop/add date for registration. After the drop/add date the University and the School of Architecture shall be the sole arbiter of what constitutes appropriate attendance and participation in a given course.

Please contact Karen Kensek at kensek@usc.edu by the end of the second week of class if you anticipate conflicts with religious holidays including missing lectures, inability to finish homework assignments on-time, or other items that may hinder your work in this class.

Religious Holidays and other Important Life Events

The University of Southern California recognizes the diversity of our community and the potential for conflicts involving academic activities and personal religious observation. The University provides a guide to such observances for reference and suggests that any concerns about lack of attendance or inability to

participate fully in the course activity be fully aired at the start of the term. As a general principle, students should be excused from class for these events if properly documented and if provisions can be made to accommodate the absence and make up the lost work. Constraints on participation that conflict with adequate participation in the course and cannot be resolved to the satisfaction of the faculty and the student need to be identified prior to the drop/add date for registration. After the drop/add date the University and the School of Architecture shall be the sole arbiter of what constitutes appropriate attendance and participation in a given course.

Please contact **Karen Kensek** at kensek@usc.edu by the end of the second week of class if you anticipate conflicts with religious holidays including missing lectures, inability to finish homework assignments on-time, or other items that may hinder your work in this class.

Description and Assessment of Assignments

Homework assignments are usually one or two weeks in length. If an assignment is two weeks in length, it is because it is a longer assignment, and you need the additional time to complete it. Late assignments will not be accepted; turn in what you have on the due date at the beginning of class (9:00 AM). You will receive partial credit. Successful students read the entire homework assignment before starting, read it again as they are working on it to refresh their memory, and read it yet again to verify that they have the correct elements to turn in. There is also a final project and required questions on the readings. Grades will be posted on Brightspace.

LATE ASSIGNMENTS WILL NOT BE ACCEPTED; TURN IN WHAT YOU HAVE ON THE DUE DATE. There are no “make-up” assignments or extra credit. Do the absolute best that you can on each assignment and turn it in on time. Usually you will be uploading files on Blackboard before class at 9 am and sometimes turning in a printout. Turn in what you have done for partial credit.

PLEASE NOTE THAT YOU ARE EXPECTED TO COMPLETE ALL HOMEWORK ASSIGNMENTS BY YOURSELF USING THE SOFTWARE THAT HAS BEEN ASSIGNED. COPYING OTHER PEOPLE’S FILES OR TURNING IN WORK THAT YOU DID NOT COMPLETE YOURSELF WILL RESULT IN A FAILING GRADE.

Make backups of everything!!! These should be in different locations (e.g. multiple flash drives, hard drive, portable hard drive, the cloud) and under different names. Keep older files in case the newest version somehow becomes corrupted (this has happened to me). Losing your files will not be an excuse for late or missing assignments.

Grading Breakdown

	Percentage of Grade	Assignments	Number of points
Homework Assignments	95%	Homework 1 – Introduction to BIM	20
		Homework 2 – Understanding Families	20
		Homework 3 – 2D / 3D Coordination	20
Participation	5%	Questions on readings	varies
		In-class exercises, e.g. Construction Sequencing and Clash Detection	varies
		Pop quizzes	varies
		Other	varies

Course Schedule: A Weekly Breakdown

	Lecture	Homework	Required Readings & References
			LinkedIn Learning has many teaching videos available through Brightspace.
Week 1 Jan. 16	<p>Introduction to Arch 517 Introduction to BIM and Revit</p> <p>Introduction to Families Instances and types System, loadable, in-place</p> <p>Site, contour labeling Perspective, section box, “explode” Title block</p> <p>“dumpy house”</p> <p>Introduce building choice</p>		<p>Routledge – <i>Introduction</i></p> <p>Learning Revit folder on Brightspace in homework 1 zip file</p>
Week 2 Jan. 23	<p>Discuss building choice</p> <p>More about Families Instances and types System, loadable, in-place</p> <p>see homework 2</p>		<p>Routledge – <i>Chapter 1</i></p> <p>http://www.nationalbimlibrary.com/find-bim-objects</p> <p>https://bimsmith.com/</p>
Week 3 Jan. 30	<p>Loadable Parametric Components Window and overhang examples Symbolic lines</p> <p>see homework 2</p>	HWK 1 due	Routledge – <i>Chapter 2</i>
Week 4 Feb. 6	<p>Scaling a drawing</p> <p>BIM as a Database Schedules Annotation and Detailing What is LOD?</p> <p>Curved beam, tilted wall (both ways)</p>	HWK 2 due	<p>Routledge – <i>Chapter 3</i></p> <p>BIMForum_LOD-Spec-2020</p>
Week 5 Feb. 13	<p>Massing / conceptual mass Adaptive components Rhino to Revit introduction</p>		Routledge – <i>Chapter 4</i>
Week 6 Feb. 20	<p>Revit Structure Navisworks Manage – clash detection</p> <p>End of Arch 517</p>	HWK 3 due	Routledge – <i>Chapter 5</i>

Statements on Academic Integrity, Course Distribution, and Support Systems

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Support Systems

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.
Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu

Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support

Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu Non-emergency assistance or information

Course Expenses

The estimates for the books and printing costs for this course are approximately \$75.

NOTES ON DOWNLOADING REVIT IF YOU HAVE PROBLEMS

Download **Autodesk Revit 2025** from <http://students.autodesk.com> . Download the Revit content libraries. <https://knowledge.autodesk.com/support/revit-products/learn-explore/caas/sfdcarticles/sfdcarticles/Where-to-find-Revit-Content-Libraries-to-download.html>

Student product download

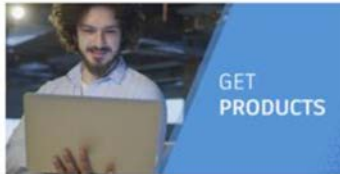
Have your student watch the following videos from the [Support page](#) on our Autodesk Education Community website.

Get started



Create an account and confirm eligibility
Learn how to create an Educational account and confirm eligibility.

▶ Watch video (3:08 min.)



Get products
Learn how to download Autodesk products.

▶ Watch video (1:13 min.)

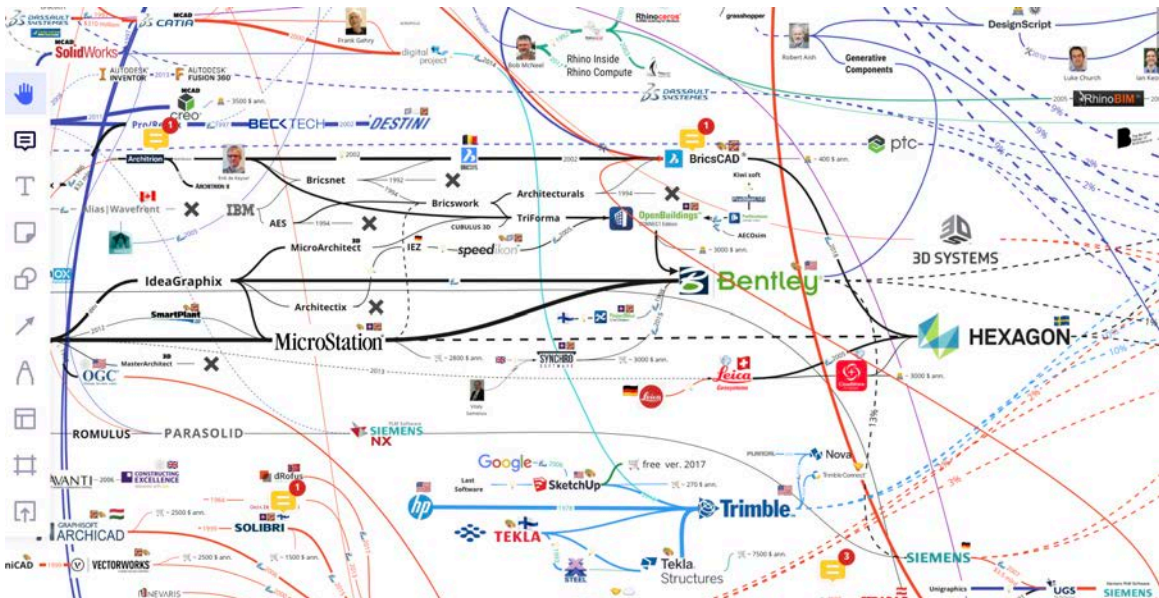
Revit product download videos

[Download Revit Product](#)

[Revit Installation Trouble Shooting](#)

Other Hints:

We have noticed recently that a few students were not able to download Revit product because they have NOT disabled pop-up blockers in their web browser.



<https://bigdataconstruction.com/history-of-bim/>