



ARCE 210: Building Information Modeling

Location and Times: TBD

Spring 2019

3 credits

Description of Course

This course focuses on the role of Building Information Modeling (BIM) in Architecture and Engineering. Students will learn the fundamental processes of BIM based on 3D computer drafting, including site analysis and data extraction, basic model building, dimensioning, planning, and elevations, parametric modeling, documentation, and 3D rendering.

Course Prerequisites or Co-requisites

ENGR 102A, ENGR 102B (College of Engineering students only).

Instructor and Contact Information

Kattaune Sobhani, Lecturer

Email: sobhani@email.arizona.edu

Office hours: TBD

Course home page: D2L

Course Format and Teaching Methods

The course is structured as a series of individual and group-based projects in which students apply the principles of building information modeling. The course content will be delivered in a computer classroom setting that allows students to immediately apply the acquired knowledge on the relevant BIM software platform.

Course Objectives and Expected Learning Outcomes

Course objectives

Upon the successful completion of this course, students should have achieved the following objectives:

- Produce 3D computer models of structures using established standards.
- Understand the transition from 2D to 3D representations.
- Be able to analyze and extract building information data for a Revit model.

Learning outcomes

The course has the following learning outcomes:

- Extract and analyze data from site topography.
- Create basic building models using structural grids and support systems.
- Design basic building components including levels, floors, roofs, etc.
- Employ parametric modeling in 3D design.
- Incorporate the mechanical, electrical, and plumbing systems into the 3D building model.
- Produce the building details and documentation.
- Create high-quality and annotated building section drawings and renderings.

ABET Criteria

Primary

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

(g) an ability to communicate effectively.

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Secondary

(b) an ability to design and conduct experiments, as well as to analyze and interpret data.

(d) an ability to function on multidisciplinary teams.

(e) an ability to identify, formulate, and solve engineering problems.

Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Participating in the course and attending lectures and other course events are vital to the learning process. As such, attendance is required at all lectures and discussion section meetings. Students who miss class due to illness or emergency are required to bring documentation from their health-care provider or other relevant, professional third parties. Failure to submit third-party documentation will result in unexcused absences.

Makeup Policy for Students Who Register Late

Students who register after the first-class meeting may make up missed assignments/quizzes and the deadline for doing so is one week after they register to the class, and no later than two weeks after the first-class meeting overall.

Course Communications

Via the official UA e-mail address and D2L.

Required Texts or Readings

Class handouts via D2L. No text books are required. See Bibliography for recommended references.

Required or Special Materials

Autodesk Revit 2017 (free for students with a valid .edu email address).
<http://www.autodesk.com/education/free-software/revit>

Assignments and Examinations: Schedule/Due Dates

12 Individual Weekly Assignments

One midterm exam: Project presentation
Final exam: Project presentation

Final Examination or Project

The final exam will be in the form of a final project and project report that will be presented no later than the last day of classes. Final projects may be individual or by groups.

<https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information>, and Final Exam Schedule, <http://www.registrar.arizona.edu/schedules/finals.htm>

Grading Scale and Policies

Grading

Evaluations will be distributed at intervals during the semester and will indicate performance according to the stated criteria of evaluation. Students are expected to use this system to monitor and adjust their performance and to seek additional support from the professor, as appropriate. Evaluations will be based primarily on student's work, rather than effort expended. Students are expected to acquire knowledge and skill, not merely endeavor to do so.

Late work

Work submitted after the deadline will be graded one or more letter grades below what would have been awarded had the work been submitted on time, appropriate to the length of delay and the importance of the assignment, at the Instructor's discretion.

Incomplete work

Work submitted that is incomplete will be graded one or more letter grades below what would have been awarded had the work been complete, appropriate to the extent of incompleteness and the importance of the assignment, at the Instructor's discretion.

Grading scale

Item	Percent All
Weekly Assignments (12 total), see schedule	60%
Midterm Presentation (based on projects, TBA)	15%
Final Group or individual Projects (TBA)	25%
Total:	100%

Grading scale: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; E < 59%

Grades will be defined as follows:

scale	undergraduate criteria
A (90-100)	Excellence in most areas of evaluation, high competence in others.
B (80-89)	High Competence in most areas of evaluation, competence in others.
C (70-79)	Fulfilled all course requirements with competence. (Competence: the answering of all requirements; adequate fitness, ability, capacity; sufficient for the purpose.)
D (60-69)	Less than competent work in one or more areas of evaluation. One or more requirements lacking and/or sub-standard quality.
E (0-59)	Substantially incomplete work and/or work of an unsatisfactory quality.
Incomplete	Work left incomplete at the end of the semester <i>due to circumstances beyond the student's control.</i>

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Dispute of Grade Policy: Students who believe they have been unfairly graded should follow the multi-step procedure outlined in the CAPLA Grade Appeal:

<http://architecture.arizona.edu/student-forms-and-procedures> Any grade dispute must be received within one week from the day that the grade is awarded.

Scheduled Topics/Activities

WEEK ONE:

COURSE INTRODUCTION: Course overview

BIM INTRODUCTION: Definition of BIM, history of BIM. BIM on the architecture and engineering disciplines

WEEK TWO:

SITE & DATA EXTRACTION: Site Topography, Building Pads

BIM BASICS: Introduction & modeling, Interface and navigation. 3D drafting: basic model building, Structural grids, support

WEEK THREE:

BIM BASICS: Introduction & Modeling (cont.)

Levels, Floors, Roofs, Ceiling, Windows, Doors.

Navigation: Ribbon, Sketch Mode, General Interface.

Basic dimensions, Building sections, plans and elevations.

BIM COLLABORATION:

Collaboration in a BIM environment

Integrated project delivery

Sharing models

WEEK FOUR:

BIM MODELING:

Systems

Structural systems

MEP systems

WEEK FIVE:

BIM MODELING:

Circulation (stairs, pathways, etc.)

Documentation

WEEK SIX:

PARAMETRIC FAMILIES:

Instance vs. Type Parameters,

Massing: In-place mass, Conceptual mass.

Families: Loading and using basic families, creating basic families

WEEK SEVEN:

MIDTERM PRESENTATIONS

WEEK EIGHT:

DETAILS AND DOCUMENTATION:

Construction details, Detail views, Sheet Organization, and Title block.

WEEK NINE:

DOCUMENTATION AND RENDERINGS:

Scheduling, Tags, Table, Legends, Advanced Annotations. 3D Renderings, Materials, Materials Library, Lighting.

WEEK TEN:

ARCHITECTURE AND ENGINEERING BIM

Collaboration benefits and limitation

Structure: MEP

WEEK ELEVEN:

CONSTRUCTION COORDINATION:

Principles of Integrated Project Delivery IPD

Model integration

Identifying and resolving issues

WEEK TWELVE:

CONSTRUCTION COORDINATION (CONT.):

Principles of Integrated Project Delivery IPD

Model integration

Identifying and resolving issues

WEEK THIRTEEN:

SOFTWARE ENVIRONMENTS:

Software environments and solutions

Pros and cons of different BIM tools.

WEEK FOURTEEN:

4D CONSTRUCTION SIMULATION SEQUENCING

Introduction into 4D sequencing

<https://www.youtube.com/watch?v=jzZlh6G9NXE>

WEEK FIFTEEN:

4D CONSTRUCTION SIMULATION SEQUENCING (CONT.)

4D sequencing

WEEK SIXTEEN:

FINAL PRESENTATIONS

Bibliography

- Wing, Eric. *Autodesk Revit Architecture 2017: No Experience Required*. Indianapolis: John Wiley & Sons, 2016.

- Kim, Marcus, Lance Kirby, and Eddy Krygiel. *Mastering Autodesk Revit 2017 for architecture*. 1st ed. Indianapolis, IN: John Wiley & Sons, 2016.
- Garber, Richard. *BIM Design: Realizing the Creative Potential of Building Information Modeling*. AD Smart 02. Chichester, U.K.: Wiley, 2004.
- Pressman, Andy. *Designing Relationships: The Art of Collaboration in Architecture*. New York: Routledge, 2014.

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities (e.g., texting, chatting, reading a newspaper, making phone calls, web surfing, etc.).

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Notification of Objectionable Materials

This course will contain material of a mature nature, which may include explicit language, depictions of nudity, sexual situations, and/or violence. The instructor will provide advance notice when such materials will be used. Students are not automatically excused from interacting with such materials, but they are encouraged to speak with the instructor to voice concerns and to provide feedback.

Accessibility and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Disability Resource Center (520-621-3268) to establish reasonable accommodations. For additional information on the Disability Resource Center and reasonable accommodations, please visit <http://drc.arizona.edu>.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

Please be aware that the accessible table and chairs in this room should remain available for students who find that standard classroom seating is not usable.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See:

<http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>.

The University Libraries have some excellent tips for avoiding plagiarism, available at <http://new.library.arizona.edu/research/citing/plagiarism>.

Selling class notes and/or other course materials to other students or to a third party for resale is not permitted without the instructor's express written consent. Violations to this and other course rules are subject to the Code of Academic Integrity and may result in course sanctions.

Additionally, students who use D2L or UA e-mail to sell or buy these copyrighted materials are subject to Code of Conduct Violations for misuse of student e-mail addresses. This conduct may

also constitute copyright infringement.

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

Additional Resources for Students

UA Academic policies and procedures are available at <http://catalog.arizona.edu/policies>

Student Assistance and Advocacy information is available at <http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

Confidentiality of Student Records

<http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.