COURSE OFFERING
SPRING, 2015

BIM Applications
CRN: 30566 ARCH4xxx – CE

Building Information Modeling Applications

Faculty: Chuck Eastman

Time: TBD
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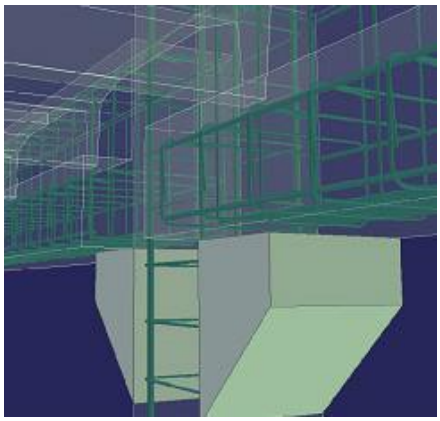
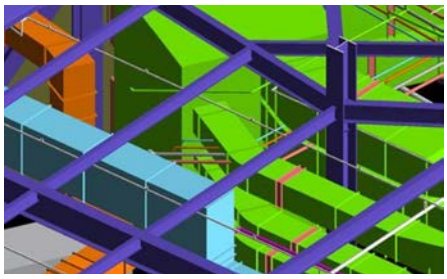
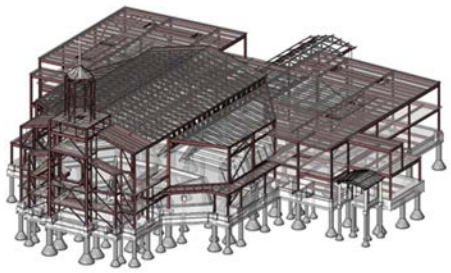
Location: TBD







Overview:

Building Information Modeling (BIM) is the bringing together of both new technologies -- for representing buildings and exchanging data –and new processes that apply to all phases of the building lifecycle. It applies directly and directly affects architectural design, contracting and construction, fabrication and facility operation and management. It is revolutionizing practices in each of these areas, and as a result, provides new opportunities for innovation, both in research and new practices in the field. It is also affecting building procurement and contracting, such as IPD, leading to additional efficiencies and benefits.

This course is meant to be an intellectual immersion into the technologies and practices involved in BIM, and new issues it introduces. It will survey the technologies and their application in practice today, and also projected technologies that are expected to emerge in the near future. It considers BIM from multiple perspectives: designer, engineer, contractor, fabricator, owner and the issues associated with these roles. Because BIM is transformational, many aspects of its use have not been sorted out nor its full implications known. We will explore these in some detail, to project what may be some of the impacts of its wide adoption.

This course invites participation from third and fourth year Undergraduate Students in all areas related to architecture and building construction. The course consists of a series of lectures on the technologies of BIM, the merging new processes, and the expected future developments that BIM allows. Different applications of BIM will also receive attention. A number of case studies will be reviewed and one written.

The course will involve quizzes and one paper dealing with different aspects of BIM. One is a case study of a BIM project, stressing new uses.. Bi-weekly reading assignments and homework is also involved.

Text: **Building Information Modeling Handbook,** by Eastman, Teicholz, Sacks and Liston.,2nd Edition, Wiley, 2011. Must acquire

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Learning Outcomes

- Learn the new conceptual framework for BIM, including:
  - Parametric modeling
  - Interoperability
  - New capabilities regardind model enchangement and checking
- Review 5-7 new workflows facilitated by BIM
- Undertake case study to gain experience in BIM application

Grade Determination:

- Technology and work flow project 40%
- Case study 40%
- Quizzes 20%
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Building Information Modeling

- The course involves the following work:
- reading, as assigned
- occasional one page reports, answering questions from book
- two papers:
- a case study of major BIM project
- the development of a new workflow facilitated by BIM
- Most readings (not all) will be from BIM Handbook, Eastman, Teicholz, Sacks, Liston (BIMH)

CLASS OUTLINE		**Assignments, Reading (not final)**
Jan. 10	1. Overview of course; grading criteria, Reading. Background of students and of Eastman. What is BIM, what are some related terms?	**Syllabus** **Reading**: BIMH: Chapter One; Case Study: Sutter Medical Center
Jan.12	2. Why is BIM having such a large impact on AEC fields? Where did BIM come from? How is happening changing the industry? What aspects of the construction industry are impacted?	
Jan.17	3. What are improvements – in design, in construction, in project delivery? How are we to assess BIM?	**Reading**: BIMH: Chapter Two Case study:One Island East - Hongkong **One page report assignment**
Jan.19	4. What is parametric object modeling? What do BIM tools do that is different? from CAD? How are BIM tools different from parametric modeling tools in manufacturing? Typed and typeless objects; modeling geometry vs. objects	
Jan.24	5. How is intelligence built into a parametric modeler? Some examples of embedded intelligence in design and fabrication.	**One page report due** **One page report assignment given out**
Jan. 26	6. What is interoperability? Why is BIM interoperability different from DXF? Why is it hard? Examples of interoperability and its limitations. How to prepare and organize a case study	**Reading:** BIMH: Chapter Three **Project Assignment One distributed-workflows** –due midterm
Jan. 31	7. What is IFC? How is it organized? What	**One page report assignment given out**

	are its strengths and weaknesses? Why is object exchange difficult?	**One page report due**
Feb.2	8. What is the National BIM Standard? What is its rationale? and practices? Examples. How is it addressing the interoperability problem?	
Feb7	9. Where is interoperability going? Model View Concepts. BIM Environments and BIM and cloud servers. Synchronization	**One page report due** **Reading:** BIMH: Chapter Five Case Study: Helsinki Music Centre
Feb.9	9. **BIM for architects:** how does it affect designers? What are its potential impacts in concept design? What are its impacts on design cognition and design exploration?	
Feb.14	10. Some impacts of BIM for the evolution of design practice. Examples of BIM for performance-based design. Why is it hard?	**One page report due** **One page report assignment given**
Feb.16	11. Integration of energy analysis for early concept design; example for use in first project paper..	
Feb.21	12. Other means to embed intelligence in systems: BIM Rule checking systems; Use of BIM in building code checking; rule-based systems	**Reading**: Rule-based system paper McGraw-Hill Survey on BIM, 2009 **One page report due** **One page report assignment given**
Feb.23	No class	**Reading**: McGraw-Hill Survey on BIM, 2009
Mar.1	13. **BIM for contractors**; applications, benefits, ROI; major benefits; changes of practice	**Reading**: BIMH Chapter Six Wisconsin BIM Guidelines **One page report assignment given**
Mar.3	14. BIM contractor applications: clash detection, cost estimating, 4D modeling	
Mar8	15. Lean construction: what is it; what are its priorities and procedures? What are its benefits? How is lean related to BIM?	Reading: Lean Principles
Mar.10	16. **BIM for Engineers**: analytical models and their management; deriving analytical models; model synchronization; workflows	**Project Assignment One due** **Presentations in class of Workflows**
Mar.15	17. Workflow assessment presentations	
Mar.17	18. Workflows for engineers; different roles at difference points in process; level of detail	**Reading**: BIMH Chapter Four Case Study: Crusell Bridge
Spring Break		
Mar.27		
Mar 29	19 **BIM for owners:** What is the owner's role in BIM? What uses of BIM should an owner or organization consider? Examples from universities, hospitals, other owners	Reading: BIMH Chapter Four
Apr. 3	20. **BIM in facility management**; BIM and rehabilitation: as built model capture; laser scanning; logistical issues;	
Apr. 5	21 **Workflow analysis**; how is collaboration done? How will it be done in the future?	
Apr.10	25**. Future developments** in architectural design and construction: commoditization, performance-based design; future developments in design collaboration,	**Reading**: BIMH Chapter Eight
Apr. 12	22. Future development in construction practices; Lean construction: what is it; what	

	are its priorities and procedures? What are its benefits? How is lean related to BIM?	
Apr. 17	23.	
Apr. 19	24.	
Apr. 24	25. Case study presentations	
Apr. 26	26. Class review – the future	**Final Project Assignment due**

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