EPFL

AR-435	**UE R: Introduction to BIM (Building Information Modeling)**

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Cursus	Sem.	Type
Architecture	MA2, MA4	Opt.
Digital Humanities	MA2, MA4	Opt.
Minor in Integrated Design, Architecture and Sustainability	E	Opt.
Mob. AR	E	Opt.

Language of teaching	English
Credits	4
Withdrawal	Unauthorized
Session	Summer
Semester	Spring
Exam	During the semester
Workload	120h
Weeks	12
Hours	**4 weekly**
Courses	3 weekly
Exercises	1 weekly
Number of positions	

It is not allowed to withdraw from this subject after the registration deadline.

Remark

Inscription faite par la section

Summary

This UE explores more in details, and in a more practical way, the concepts introduced during the BIM introduction course AR-484. All project different phases are addressed, with an emphasis on interdisciplinary collaboration and data exchanges.

Content

This Teaching Unit is an introduction to a series of knowlege and issues at stake, necessary and critical, in an evolving practice of the architectural projetc at a global scale. Understanding and mastering these knowledge and technologies within a semester, thanks to a series of exercices applied to a case study of small scale, would allow for practical reuse and implementation in future projects. The case study is a bus stop shelter project conceived and realized by *Richter Dahl Rocha & Associés at Ecublens*, *Abribus RC1* and with whom we will be in direct exchange during the semester. The content of the unit is organised along the three first phases of an architectural project. Each session consists in an introductory lecture of 30 minutes and followed by applied exercices on the same topic. Each phase will enriched by one or two lectures from an external personality.
- Phase 1 : Pre-Schematic
19th September: *Introduction to BIM and used technologies*
26th September: *Paramétric and Associative Modeling*
03rd October: Project *Standards and Méthods*
- Phase 2 : Schematic
10th October: *Concurrent Design*
17th October: *Project Phasing and Méthodologies*
24th October: *Collaborative Project and Workflow*
31st October: *BIM Execution Plan and Management*
- Phase 3 : Design Development
07th November: *Associative Documentation*
14th November: *Multi-Criteria Performances*
21st November: *Scenarios Analysis*
28th November: *Final Developpements*
05th December: *Final Presentations*

Keywords

geometry, parametric and associative modeling, methodologies, components, assemblies, building information modeling, integrated project delivery, metadata, concurrent project, rules and constraints, design-to-production, integration, building lifecycle management, product data management.

Learning Prerequisites

Required courses

Recommended courses

This Teaching Unit is complementary of the course *Computer Assisted History* (AR-520 CAH), while remaining open to students who would not have chosen this course.

Important concepts to start the course

computer aided design (CAD), computer aided manufacturing (CAM), parametric modeling, associative modeling, rule based design and constraints, collaborative project, project phasing

Learning Outcomes

By the end of the course, the student must be able to:

- Model several project phases.
- Design in an associative and collaborative manner.
- Coordinate various knowledge and disciplines.
- Assess / Evaluate design hypothesis.
- Integrate heterogeneous data.
- Optimize design parameters.
- Systematize project design and documentation.
- Synthesize project data and constraints.
- Analyze model performances.

Transversal skills

- Use a work methodology appropriate to the task.
- Assess progress against the plan, and adapt the plan as appropriate.

Teaching methods

Most of the unit consists in the modeling of a bus stop shelter project, from its pre-schematic phase to its design development. While applying collaborative and integrative BIM principles. The various notions and technical data of the project (parametric and associative modeling, collaborative workflow, project phasing, management and documentation of metadata, performances and scenarios anaylisis, ...) will be first introduced as practical exercices to later be used in the design and management in groups of a bus stop shelter project. A series of short presentations and lectures by external personalities will illustrate the contemporary practice of these methods in architecture and engineering.

Expected student activities

Besides attendance to all sessions, continuous and essential to the understanding of taught successives and cumulatives methods and knowledge, a series of modeling and project management exercices will be assigned during the semester in a progressive manner and will be used to integrate thsi knowledge in a BIM collaborative project of bus stop shelter. This project model will be presented and submitted at the end of the semester. Exercices will be individual and projects collective.

Assessment methods

Assiduity, attendance to sessions : 20%
Assimilation, modeling and project management exercices : 20%
Integration, design and development of a bus stop shelter : 60%.

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes
Others	Software tutorials

Resources

Virtual desktop infrastructure (VDI)

Yes

Bibliography

- *Architectural Geometry*, Helmut Pottmann, Andreas Asperl, Michael Hofer, Axel Kilian, Bentley Institute Press, Exton, 2007.
- *Building Information Modeling*, Karen M. Kensek, Routledge, New York, 2014.
- *Building Information Modeling : BIM in Current and Future Practice*, Karen M. Kensek, Douglas Noble, Wiley, London, 2014.
- *Closing The Gap : Information Models in Contemporary Design Practices*, Ed. Richard Garber, AD Magazine, Mars 2009.
- *Concurrent Geometric, Structural and Environmental Design : Louvre Abu Dhabi*, Frédéric Imbert, Kathryn Stutts Frost, Al Fisher, Andrew Witt, Vincent Tourre, Benjamin Koren, in Advances in Architectural Geometry, Eds. Lars Hesselgren, Shrikant Sharma, Johannes Wallner, Niccolo Baldassini, Philippe Bompas, Jacques Raynaud, Springer, Vienne, New York, 2012.
- *Networked Space, Dennis Shelden, in Computation Works : The Building of Algorithmic Thought*, AD Magazine, Mars 2013.

Ressources en bibliothèque

- BIM et architecture / Hoyet
- Cahier technique SIA 2051 - Building Information Modelling (BIM)
- BIM Handbook / Eastman
- The BIM Manager's Handbook / Holzer
- Documentation SIA D 0270 (en allemand / pas de version française)
- Documentation SIA D 0271 (en allemand / pas de version française)
- City of bits / Mitchell
- BIM et maquette numérique pour l'architecture, le bâtiment et la construction / Celnik
- Manuel BIM / Kensek
- Architecture in the digital age design and manifacturing / Kolarevic

Websites

- http://cnpa-tuto.epfl.ch/
- https://objectif-bim.com/
- https://e-learning.abvent.net
- http://www.bauen-digital.ch
- http://buildingsmart.org
- http://bimblog.lu
- http;//bimblog.bondbryan.com

Moodle Link

- https://go.epfl.ch/AR-435

Videos

- https://www.youtube.com/user/Archicad
- https://www.youtube.com/watch?v=IHynUsUZDv8