



**UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL  
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA CIVIL:  
CONSTRUÇÃO E INFRAESTRUTURA**

<b>Código:</b>	PCI0006
<b>Título:</b>	INTEGRATED PROJECT DELIVERY AND BIM
<b>Número de créditos/carga horária:</b>	3 (45 horas/aula)
<b>Nível:</b>	<b>(x) Mestrado (x) Doutorado</b>

**Course description:**

Project management and complexity. New approaches – value based management and BIM. Concepts and principles on project collaboration – *Integrated Project Delivery*. BIM: opportunities and challenges, BIM and product development process, BIM for construction project management. BIM implementation strategies.

**Topics:**

1. *Building Information Modeling* (BIM) – Overview, concepts and definitions: BIM and parametric model rise and evolutions. Parametric models and interoperability. BIM and the construction project lifecycle. Common Data Environment (CDE). Data and process modeling.
2. Interoperability and BIM: Object orientation and construction. Open BIM. Industry Foundation Classes (IFC). Classification systems. Component libraries. BIM and the construction supply chain.
3. BIM for the product development: Project management and complexity. Value generation and the design process. Traditional and novel approaches for project management. BIM modeling process. Workflow overview. Level of Development (LOD). BIM Execution Plan (BEP). BIM and project phases. Design process planning and BIM. Project coordination and BIM modeling process. Model quality. Design coordination workflow. Software alternative for supporting BIM design coordination.



4. BIM in the project life cycle: BIM multiple dimensions. BIM for construction and project life cycle. Challenges for integrated BIM in the construction phase. Production planning and control of the construction project. BIM 4D. BIM 4D and Last Planner System. BIM for production control. BIM 5D and cost management in construction projects. Quantity take-off (QTO). Benefits and challenges of BIM 5D application to production costs planning and control in the construction project. BIM for Life Cycle Assessment. BIM for Facilities Management.
5. BIM for construction project management: Value based management and BIM. Limitations of the traditional project management approach. Novel approaches for project management. Lean and BIM interaction and synergies.

### **Objectives:**

The course focuses on the fundamental concepts and practices involved in the use of Building Information Modeling (BIM) for construction project management, by presenting to the student. It will give students an overall understanding of BIM, presenting the advantages and challenges for its use throughout the lifecycle of a building, from planning, design, construction, operation, and management. The course will also provide students the necessary elements to understand how BIM technology contributes to develop a collaborative and multidisciplinary environment for the construction project, including communication among stakeholders, clash detection, design integration and coordination, and change management.

### **Work method (main activities):**

Regular classes. Papers reading and discussion. Guest lectures. 4D and 5D BIM modeling workshops. Individual and group assignments.

### **Grading:**

Grading will be based on two components, a group assignment involving the use of BIM software for solving a practical problem, and an individual assignment comprehending the preparation of an academic paper that delves into one of the topics discussed in the course.



## References

### Basic references

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AIA – AMERICAN INSTITUTE OF ARCHITECTS. **Integrated Project Delivery: A Guide**, 2007.

BORRMANN A., KÖNIG M., KOCH C., BEETZ J. (eds) **Building Information Modeling**. Springer, Cham. 2018.

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LEITE, F. L. **BIM for Design Coordination**. Wiley: Hoboken, New Jersey. 2020.

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### Supplementary references

BIOTTO, C.; FORMOSO, C. T.; ISATTO, E. L. *Uso de modelagem 4D e Building Information Modeling na gestão de sistemas de produção em empreendimentos de construção*. **Ambiente Construído**, 2015, v.15 n.2

DAVE, B.; KOSKELA, L.; KIVINIEMI, A.; OWEN, R. L.; TZORTZOPOULIS FAZENDA, P. **Implementing lean in construction: Lean construction and BIM**. CIRIA, 2013.

DANG, T. ;BARGSTÄDT, J-H. *4D Relationships: The Missing Link in 4D Scheduling*. **Journal of Construction Engineering and Management**, 142, 4015072, 2016. DOI: 10.1061/(ASCE)CO.1943-7862.0001007.

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HEIGERMOSER, D. et al. *BIM-based Last Planner System tool for improving construction project management*. **Automation in Construction**, v. 104, p. 246–254, 2019.



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SACKS, R.; RADOSAVLJEVIC, M.; BARAK, R. *Requirements for building information modeling based lean production management systems for construction*. **Automation in Construction**, 2010, n.19, p.641-655.

XUE, W.; WANG, Y.; MAN, Q. *Research on information models for the construction schedule management based on the IFC standard*. **Journal of Industrial Engineering and Management**, v. 8, n. 3, p. 615–635, 2015.

Van BERLO, L. A. H. M. et al. *Collaborative engineering with IFC: New insights and technology. eWork and eBusiness in Architecture, Engineering and Construction*. **Proceedings of the European Conference on Product and Process Modelling 2012, ECPPM 2012**, p. 811–818, 2012.