EVDS 683.99 | Seminar & Workshop | H(3-0)
BUILDING PERFORMANCE SIMULATION

Instructor: Branko Kolarevic, branko.kolarevic@ucalgary.ca
Tuesdays & Thursdays 9:30-10:50, PF 2110

Introduction

Building performance simulation (BPS) relies on processes and computer based analytical techniques to aid the decision making in design, operation, or management of buildings. This course introduces the concepts, digital tools, assumptions and limitations which underlie the methods currently used to appraise the performance of buildings. The course consists of lectures and tutorials designed to demonstrate key concepts and essential features of performance analysis software and provide practical "hands-on" experience.

Objectives

Students will learn about the essential concepts and methods associated with various analytical techniques used in building performance simulation (BPS), the various ways in which BPS is used currently in the building industry, and its broader implications for the relationships between architectural design and the various engineering disciplines. In addition, students will acquire practical skills in using software programs made by Autodesk, such as Ecotect (solar radiation, daylighting and energy analysis), Robot (structural modeling and analysis), Simulation CFD (air flow and heat transfer), etc. (Students can download for free these Autodesk programs from students.autodesk.com.)

Prerequisites

Students should have completed all of the required building science and technology courses, including structures, lighting, and design of environmental systems, and also the comprehensive design studio. An understanding of principles that govern the design of various building systems is expected, as is the knowledge of 3D modeling.

Teaching Approach

Most of the class meetings will consist of demonstrations of essential concepts and modeling techniques in various software programs that will be used for performance analysis. Some of the class meetings will be devoted to lectures and/or discussions; there will be several guest lectures during the term. Students will develop models for different analyses of their own Comprehensive Design Studio project. There will be three analysis-based projects during the term. In addition, each student will submit at the end of the term a short, two-page paper (1,000 words) addressing in critical fashion a BPS-related issue that should emerge during the course.

Means of Evaluation

The final grade will be based on three modeling and analyses projects (1 – 30%, 2 – 30%, 3 – 20%), plus the short, two-page paper (20%). Please note that the relative weighting of each project may change.

Grading Scale

Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range. Standard EVDS grading scale will be used in all evaluations.

Topics/Schedule (by week)

9/10 Overview
9/12 Modeling for Analysis

9/17 Whole Building Energy Analysis
9/19 Solar Radiation Analysis

9/24 Detailed Energy Analysis
9/26 Lighting Analysis

10/1 Wind Analysis
10/3 Project 1 consultations

10/8 Guest Lecture (TBD)
10/10 Project 1 presentations

10/15 Block week (no class)
10/17 Block week (no class)

10/22 Structural Modeling for Analysis
10/24 Project 2 consultations

10/29 Structural Analysis and Design
10/31 Project 2 consultations

11/5 Advanced Structural Analysis
11/7 Guest Lecture (TBD)

11/12 Fall Convocation (no class)
11/14 Project 2 presentations

11/19 Modeling of Fluid Dynamics
11/21 Project 3 consultations

11/26 Air Flow and Heat Transfer
11/28 Project 3 consultations

12/3 Guest Lecture (TBD)
12/5 Project 3 presentations

Note: The schedule is tentative and subject to change depending on the progress of the class.

Notes

1. Written work, term assignments and other course related work may only be submitted by e-mail if prior permission to do so has been obtained from the course instructor. Submissions must come from an official University of Calgary (ucalgary) email account.

2. It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Student Accessibility Services, please contact their office at 220-8237. (http://www.ucalgary.ca/access) Students who have not registered with the Student Accessibility Services are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.

3. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.

4. Information regarding the Freedom of Information and Protection of Privacy Act (http://www.ucalgary.ca/secretariat/privacy) and how this impacts the receipt and delivery of course material

5. Emergency Evacuation/Assembly Points (http://www.ucalgary.ca/emergencyplan/assemblypoints)

6. Safewalk information (http://www.ucalgary.ca/security/safewalk)

7. Contact Info for: Student Union (http://www.su.ucalgary.ca/page/affordability-accessibility/contact); Graduate Student representative(http://www.ucalgary.ca/gsa/) and Student Ombudsman's Office (http://www.su.ucalgary.ca/page/quality-education/academic-services/student-rights).