4.481 Building Technology Seminar – Syllabus

Term: Fall 2018

Department: Architecture

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Time & Location: Thursdays 1pm-3pm
5-418 (BT conference room)

Prerequisite: Permission of instructor, required subject for all entering graduate students in the Building Technology Program

Credits: 2-0-1

Course Description

The Building Technology Seminar introduces the research process and supports the development of a research agenda for incoming students in the program. This seminar is organized around readings, building analyses, and student and faculty presentations. Topics of the seminar are drawn from a range of ongoing research interests, including thermal comfort, building systems analysis and control, building energy and materials, structural analysis and design and urban systems and dynamics.

The seminar offers an opportunity for students to understand the landscape for research in building technologies while developing their own interests and research agenda in a methodical manner. The seminar also offers the opportunity for incoming students to become familiar with the nature of building technology research in the Department of Architecture at MIT including aspects of the overall process, pacing, logistics, collaborative opportunities etc. Specific aspects of the research process including the development of a research question, the identification and alignment with a research community, and thought process and logistics involved in preparing and publishing a peer reviewed scientific document. In addition, the communication of your interests, your research statement and intended results will be addressed and evaluated. Oral communication in particular will be a focus of the seminar.

Learning Objectives

The course aims to help incoming Building Technology students to:
- Start developing a research agenda for their time at MIT
- Develop relationships with the other members of the BT community
- Apply Building Technology research methods to an architectural space
- Practice presenting your work to a scientific audience
- Understand the mechanics and inner workings of scientific publishing
Assignments Overview

Assignments are described below. First, you will be asked to study a space in terms of a diverse set of performance attributes. This brief exercise is independent of the development of your research topic though it could be related if you wish. The majority of your activities will be focused on the development of a research agenda. Doing so will entail both written and oral work.

Written work and presentation slides should be submitted to Stellar by the due dates specified below. You will be receiving feedback from you BT Advisor. In case you do not have a BT Advisor, feedback will be provided by the coordinating instructor.

Architectural space and building system study

The goal of this assignment is to practice the use of experimental building technology methods to evaluate the environmental or resource performance of a study space. The analysis may include measurements of temperature, relative humidity, wind speed and mean radiant temperature as well as plug loads for either spot measurements or an extended period of time. Other possible modes of evaluation include observations, occupant surveys and/or simulations.

We would like you to identify a specific performative question to answer for an architectural space that you have access to. Define a scope of study that isolates a set of physical and/or nonphysical attributes and relates these attributes to specific building systems or other elements of the architecture. The intent is to focus on the relationship between the use and performance of existing spaces in light of the design and engineering that went into their creation. You may choose a successful space and outline the ways in which it serves occupants, or you may decide to study a space in which the architecture, building systems, occupant use or another element has led to a somewhat unsuccessful outcome.

Performance can be determined by defining a variety of goals, general and specific. These goals may be quantitative and qualitative. Meeting the specific goals of the architectural and engineering intent of the space may occur during short periods of time; hourly, daily or weekly, or at much longer periods of the lifetime of the building or even city. It is up to you to define the attributes of performance and the time period within which this performance is to be evaluated. The assignment is to be completed in two stages. First, find a space, define the attributes that you wish to study and outline a procedure for analysis. Second, run your analysis and reach conclusions that you will present to the seminar.

Assignment Products:

- **Sept 19:** One page synopsis of the scope of the study including identification of the space or building and description of the analysis to be undertaken.
- **Oct 25:** Completed analysis of architectural space and building system. Present your findings orally in a 10-minute visual presentation using a PowerPoint, pdf, keynote, or other presentation format (please note that there is no written component of this assignment).
Research Agenda Development

Develop an agenda for the research that you intend to accomplish at MIT. This is the central mission of the seminar. You will arrive at this agenda in stages. Seminar discussions, presentations, and assignments will support the regular meetings you will have with your advisor. The final product of the seminar will serve as the statement of research goals and agenda for your activities in research in the Building Technology Program.

Assignment Products:

- **Sep 26**: One page synopsis of the scope of your research interests. Specify the context for your work, the community that it serves and the importance of the research question that you are posing.
- **Oct 3**: First oral research presentation: Your presentation should introduce your research topic, provide some background, motivate your work and outline the methodology that you are intending to use along with some preliminary results (if applicable).
- **Oct 17**: Annotated Literature Review: commented list of relevant references Notes: To be discussed with advisor --- General guidelines: Commented list of relevant references/articles (minimum 6, usually about 10---15 references); for each, provide a synopsis of a few lines and why it is relevant to your work, accounting for suggestions provided during research project presentation.
- **Nov 14**: One minute video on your research project
- **Nov 21**: Research Agenda completed. General guidelines: 1) Abstract that briefly describes the thesis subject and context; 2) State of the art: context of research, problem to be answered put in context with commented relevant references (updated/extended), major issues to be addressed; 3) Bibliography list. This document should be carefully organized and well written; it forms the basis of a thesis proposal for SM students and may serve as the required qualifying paper for PhD students.
- **Dec 5**: Final oral research presentation
## Weekly Overview

<table>
<thead>
<tr>
<th>Date</th>
<th>Content</th>
<th>Assignment due</th>
<th>Faculty and guests</th>
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<tbody>
<tr>
<td>Sept 5</td>
<td>Course Introduction</td>
<td></td>
<td>All</td>
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<tr>
<td>Sept 12</td>
<td>Research methods, resources, presentation skills</td>
<td></td>
<td>CM, LG</td>
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<tr>
<td>Sept 19</td>
<td>Meeting with senior BT students</td>
<td>One page space study synopsis</td>
<td>Students TBA</td>
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<tr>
<td>Sept 26</td>
<td>Scientific Publishing – Library resources; authorship</td>
<td>One page draft research interest</td>
<td>Elizabeth Soergel, CR</td>
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<td>Oct 3</td>
<td>Student research presentation 1</td>
<td>First oral presentation</td>
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<tr>
<td>Oct 10</td>
<td>Faculty research overview</td>
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<td>LG</td>
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<tr>
<td>Oct 17</td>
<td>Faculty research overview</td>
<td>Annotated literature review</td>
<td>CR</td>
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<td>Oct 24</td>
<td>Space study presentation</td>
<td>Completed space study</td>
<td>All</td>
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<td>Oct 31</td>
<td>Scientific publishing – What makes an impactful paper?</td>
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<td>Nov 7</td>
<td>Preparing scientific videos</td>
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<td>MIT ODL</td>
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<tr>
<td>Nov 14</td>
<td>Faculty research overview</td>
<td>Upload a 1 minute video on your research project</td>
<td>CM</td>
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<tr>
<td>Nov 21</td>
<td>Faculty research overview</td>
<td>Research agenda</td>
<td>LN</td>
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<td>Nov 28</td>
<td>No class (Thanksgiving)</td>
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<td>All</td>
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<td>Dec 5</td>
<td>Student research presentation 2</td>
<td>Second oral presentation</td>
<td>All</td>
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