

## **F21 48-116 Building Physics (BP)**

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Building Physics (BP) course is conceptually located at the nexus of “sustainability, design and computation” with the goal of introducing fundamental theories of building physics and simulation-aided design development skill sets in the fields of building lighting and thermal performance and room acoustics.

By taking this project-based course, students of architecture will develop a generative knowledge base on (1) photometric principles to characterize the indoor luminous environment, (2) on heat transfer mechanisms and thermodynamic principles to evaluate the thermal interactions of building spaces with outdoors and (3) on acoustical parameters of sound propagation used to define occupant’s aural comfort. BP course will let students to turn this knowledge base into designer insights and intuitions through simulation-aided analysis of various design strategies for the ultimate objective of creating a building space with improved performance on environmental sustainability and occupational well-being.

Students will leave this course with the basic understanding of the quintessential relationships between the first principle theories of building physics and environmentally responsive architectural design strategies. This will help students to develop the habit of using fundamental physics as a generator of novel design concepts. Students will also acquire a working knowledge and complete proficiency in state-of-the-art physics-based simulation programs which can be effectively utilized in future design studio courses during their undergraduate education. All the necessary skill sets targeted in this course are also readily applicable to students’ future professional design practices. The content, assignments and learning activities of the BP course are carefully calibrated to architecture students’ backgrounds, knowledge base and experiences with attention to integration to the studio courses as well as current trends in architectural design (high-performance buildings & environmental sustainability & user-centered design approaches).

BP course is comprised of lectures introducing the fundamentals of building physics which are blended with a rich set of synchronous and “inter-active learning sessions” (e.g., discussions, polls, brainstorming sessions, precedent analyses, software demonstrations and workshops, project development workshops). Final learning goals the course will be achieved with the addition of out-of-class/asynchronous learning exercises (e.g., simulation runs, design development studies, narratives and reports and presentations, and quizzes).

BP course requires basic level “building design” and “graphic communication” education and “3D modeling proficiency” together with fundamental understanding of “classical physics” which are already possessed by the second-year students of architecture.