

Sustainability, Health and Productivity to Accelerate a Quality Built Environment

48-729 Fall 2021 Intelligent Workplace T/R 8:35-9:55

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Course Description

Given the United Nations Sustainable Development Goals and the growing demand for sustainable design by federal and private sector clients, professional practices are “tooling up” all over the world to deliver high performance and environmentally responsible buildings, infrastructures and communities. However, investments in ‘green’, high performance building solutions and technologies are still limited by first cost decision-making, and life cycle tools are still largely inaccessible to professionals.

This course explores the relationship of quality buildings, building systems, infrastructures and land-use to productivity, health, well-being and a sustainable environment. The course begins with a series of lectures on high performance enclosure, mechanical, lighting, interior and networked building design decisions and extends to sustainable communities and infrastructures. The course engages students in the research literature that relates these building design decisions to multiple cost/performance impacts, including: energy, carbon, facilities management, organizational change, technological change, attraction/retention (quality of life) of employees, individual productivity, organizational productivity, salvage and waste (the circular economy), tax/ insurance/ litigation, and human health.

The CMU Center for Building Performance and Diagnostics has developed a cost-benefit decision support tool, BIDS, to present the substantial cost-benefits of advanced and innovative building systems designed to deliver privacy and interaction, air quality, ergonomics, lighting control, thermal control, network flexibility, and access to the natural environment. Diving into the most recent field and laboratory research linking building design and environmental quality, students will summarize and quantify 3-4 new research studies that offer life cycle justifications for high performance design innovations - focused on the areas of greatest interest to their thesis or professional aspirations. Each student will develop three concise summaries and baseline economic data, as well as an executive summary, to illustrate the amazing return on investments possible through a range of cost-benefits from the “immediate dollars” of energy efficiency, waste management and churn to the “long term dollars” of improved indoor environmental quality, productivity and health.

Environmental design principles are critical to our professional commitment to improving quality of life through the built environment, and life-cycle decisionmaking is central to national commitments to designing and upgrading buildings and communities to ensure a shared quality of life.