### Instructor: Mark Taylor

#### Arch 576 Seminar – Innovative Solar Powered Homes – Past, Present, and Future. School of Architecture - Graduate Level

### Agenda:

**In relation to the Sustainability Learning Outcomes, what do you want students to learn?**

Students will learn to think holistically about sustainability using perspectives across multiple disciplines. Students will develop an integrated vision for sustainability that embraces personal lives, professions, and local communities.

**Ideas for including sustainability in the syllabus – The aim of the seminar**

This seminar will consider the legacy of the US Department of Energy’s Solar Decathlon competition and propose buildings that address the rules of the competition but will not necessarily conform to their absolute constraints. An analytical understanding of the rules of the decathlon will be required so an informed designed response can be made. Analysis of the rules will spark discussions of what sustainability really should be in the context of a built environment. The aim of the seminar is to explore the positive aspects of the Decathlon competition but to loosen the focus to discover sustainable design solutions that would more likely be built in greater volume in the real world. If you consider the Solar Decathlon Competition analogous to Nascar, this seminar is looking for the next generation of medium to high volume production models and/or niche market solutions for those who want to buy into a sustainable lifestyle but have little knowledge of what that will entail.

### Context:

The solar decathlon competitions hosted by the US department of energy have undoubtedly promoted solar technology in a residential setting, however the competition has been criticized for encouraging the construction of excessively expensive small homes. In recent years the competition has been “franchised” to enable similar investigations of energy efficient living to take place on different continents and in different contexts. The most recent addition to the Solar Decathlon “franchise” is in the Peoples Republic of China, who will host their version of the competition in a former coal-mining town in the summer of 2013. The University of Illinois has a strong legacy in relation to the Solar Decathlon competition having competed in 2007, 2009, 2011 and in China in 2013. Each building was an evolution of research, lessons learnt from one competition to the next. In the process some principles were strengthened while different design approaches were made.

#### Catalyst:

The US dept. of Energy's solar decathlon competition has been a catalyst to showcase innovative technologies and engage students in the design and build process. Unfortunately even though the designs are in public domain few if any have been replicated outside of the competition. This seminar will attempt to address that failing by scrutinizing the rules and contests and seek to amend them so the long-term legacy of the competition has a greater impact on the built environment.

### The Design of A House of Approximately 1000 sq/ft that Promotes a Sustainable way of Living - Expected Design Outcomes:

Although the seminar is purposively open-ended, the instructor is expecting that all, or some of the following results will probably occur:

1. A high-end design solution will be proposed as it will be the only way to receive architectural acclaim and satisfy the needs for high performance fenestration. Comparison of this design in different geographic locations will round out this investigation.

2. An Urban solution will be proposed, as this will be seen as the most sustainable solution to residential living. This solution will address the needs for dense urban housing, probably nested together to maximize energy performance by minimizing floor to wall ratios. This investigation will be rounded out by considering different cultural contexts (eg NY city and China) for dense urban living.

3. A starter home of minimum cost, with growth potential, will be proposed as a demonstration of a house that can sustain an individual or family over a lifetime. Ideally this model will address the needs of affordable housing over the lifecycle of the building. This investigation will be rounded out by considering different wall assemblies, their impact on building delivery methods, building performance and the life expectancy of a building. Advanced studies will quantify lifecycle and embodied energy costs.