Course Syllabus
Sustainable Housing -- Community, Environment, and Technology   Fall 2015

ESPM 3601 (Environmental Sciences, Policy and Management)
HSG 3482 (Design, Housing, and Apparel)
3 credit hours

Course Title: **Sustainable Housing -- Community, Environment, and Technology**
Days & Time: Monday and Wednesday, 1:30p to 2:45p
Location: Borlaug Hall 335

Instructor: Bob Seavey
Room 202 Kaufert Laboratory
Office hours: 2:30p to 3:30p Monday and Wednesday (and by appointment)
Phone: 624-3028
Email: seave001@umn.edu

Course Description
For students interested in sustainable housing, green buildings and the technology
required for high performance structures. This course is designed for a broad audience of
students. We begin with a section on society and housing, exploring how sustainable
housing practices build community. The second phase of this course focuses on the
relationship between society and the environment. We explore questions about how
community growth has impacted the environment and how natural events impact our
communities. Finally, the class concludes with a section on building science: how houses
work as a system. In this section, we explore the science and technology required to
build high performance houses.

Course Objectives
1. To acquaint and analyze the impact of society on the natural environment and to formulate
an ethical framework for evaluating these developments.
2. To understand, in some depth, the various visions and interpretations of sustainability
related to society, housing, and the environment.
3. To develop a rigorous framework for assessing the role of technology as it relates to
building materials and energy sources for housing.
4. To foster a mindset of reflection and objective evaluation, considering multiple viewpoints,
as we consider housing technology and community development.

Reading Materials

Sustainable Housing: A Systems Based Approach   Robert Seavey
The Bulldozer in the Countryside   Adam Rome

Additional required reading materials will be posted via the University of Minnesota's
Moodle, accessible through myU at http://myu.umn.edu or available online.

Attendance, Participation and Deadlines

Students are expected to be in class and on time everyday. When an absence is unavoidable, it is the student's responsibility to determine what was missed.
Even though this is a fairly large class, respectful group interaction is encouraged. Please share your ideas and be open to learning from one another. Students are responsible for submitting work on time. Late assignments will be down graded.

Grading:

Participation (Attendance and Class Discussion)	5 percent
Newspaper Reports/ Assignments (3)	5 percent
Group Project -- Poster Presentation	10 percent
Quizzes (3)	10 percent
Exam I	20 percent
Exam II	20 percent
Final Exam	30 percent

Final letter grades will be based on straight scale percentages:

94-100	=	A
90-93	=	A-
87-89	=	B+
84-86	=	B
80-83	=	B-
77-79	=	C+
74-76	=	C
70-73	=	C-
67-69	=	D+
60-66	=	D
0-59	=	F

Statement on Climate of Inclusivity

You are expected to be attentive during class, ask questions if you do not understand something, and to offer your opinion. You are also expected to listen respectfully to other students and to me when speaking. Racism, sexism, homophobia, classism, ageism and other forms of bigotry are inappropriate to express in this class.

Statement on Mental Health and Disability Services

Disability Services: As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental

health concerns or stressful events may lead to diminished academic performance or reduce your ability to participate in daily activities. University of Minnesota services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via http://www.mentalhealth.umn.edu
If you have any special classroom requirements, please contact one of the offices bellow. They will work with you and, if necessary, they will contact the instructor to work out the details of any necessary accommodations.

Student Academic Success Service and Counseling/Consulting Services	340 Appleby Hall, Mpls *199 Coffey Hall, St. Paul*	612-624-3323 *612-624-3323*
Disability Services	*180 McNamara, Mpls*	*612-626-1333*
Center for Writing	*10 Nicholson Hall, Mpls*	*612-626-7579*

Use of Student's Work

Students understand that enrollment in this course grants consent for their work to be selected for inclusion in college or departmental publications (online or in print). Your instructor may select to use your work to represent her/his skills as an instructor in a teaching portfolio (online or in print).

Newspaper Reports

For each newspaper report, read and critique a current newspaper article in light of materials learned in class. Each critique is to be one typed page that describes and analyzes the article.

We will discuss the specific instructions for these assignments and reports in class. Instructions will be posted on the Moodle site for this course. Also on the Moodle site is information on writing papers, conducting research, and using academic sources.

Course Schedule

This is a general course outline and is subject to change.
Any changes will be announced in class and are each student's responsibility.

Week 1 Course Introduction   September 9
           -- Definitions of sustainability as related to housing

               Reading: Chapter 1 *Sustainable Housing*

Week 2 Technology and Society   September 14 & 16

           Affordable Housing – Introduction
                   Reading: Chapter 1 & 2 *Sustainable Housing*

Week 3 Community and Sustainable Housing   September 21 & 23
               -- Volunteerism: Habitat and Third Sector
               -- Wilder/Habitat experience
               -- Urban Homeworks: case study

               Reading: Chapter 2 *Sustainable Housing*

       First Newspaper Write-up: Due Wednesday, September 23

Week 4 Panel Discussion   September 28

           Introduction: Approaches to Sustainable Communities (September 30)

               Reading: Chapters 2 & 3 *Sustainable Housing*

Quiz #1: Wednesday, September 30

Week 5 Approaches to Sustainable Communities   October 5 & 7

       Reading: Chapter 3 *Sustainable Housing*

Week 6 Introduction to Suburbia and Sprawl   October 12 & 14

       Reading: Chapter 4 *Sustainable Housing*
       Rome: Introduction and Chapter 1

Exam I – Monday, October 12

Week 7 Suburbia And Sprawl   October 19 & 21

     Solar Homes and Water Resources and Housing

       -- Municipal water supply
       -- Septic issues and water treatment after usage

    Second Newspaper Write-up: Due Wednesday, October 21

       Reading: Chapter 4 *Sustainable Housing*
       Rome: Chapters 2 & 3

Week 8 Suburbia And Sprawl   October 26 & 28

     Where not to build and Open Space

     Energy and Housing – Introduction: Coal and Petroleum

       Reading: Chapters 4 & 5 *Sustainable Housing*
       Rome: Chapters 4 & 5

Week 9 Energy and Housing   November 3 & 5

     Natural gas through nuclear power (November 3)
     Renewable energy (November 5)

Quiz #2: Wednesday, November 5

       Reading: Chapter 5 *Sustainable Housing*

Week 10 Prosperity and Preservation   November 9 & 11

American heritage
Calling to nature

       Reading: Chapter 6 *Sustainable Housing*

Week 11 Prosperity and Preservation   November 16 & 18

Green Building Models (LEED & Green Globes) and Certification
       -- Evaluation criteria
- Cost/benefit
- Embodied energy
- LCA

     -- Wood, concrete, steel, plastics
     -- Smart growth
     -- Community vs. property rights

       Reading: Chapter 6 *Sustainable Housing*

Exam II Wednesday, November 18

Week 12 Introduction to Building Science   November 23 & 25
       -- Role of design in sustainable housing
       -- Planning and designing the building enclosure

       Reading: Chapter 7 *Sustainable Housing*

Week 13 Building Science – Enclosure and   November 30 & December 2
           Mechanical System

       -- Building enclosure
       -- Planning for high performance buildings: Net-zero and passive houses

       -- Mechanical systems (heating and air conditioning)

Posters Due – Wednesday, December 2

       Reading: Chapters 7 & 8 *Sustainable Housing*

Week 14 Building Science Mechanical Systems   December 7 & 9
           and People Factors

      -- Ventilation
      -- Indoor air quality
      -- People factors – introduction

      Reading: Chapters 8 & 9 *Sustainable Housing*

Quiz #3: Monday, December 7

Assignment: Reflections 2080 Due Wednesday, December 9

Week 15 People Factors Wrap-Up   December 14 & 16
           Course Review (for final)

Poster Presentation – Monday, December 14

      Reading: Chapter 9 *Sustainable Housing*

Final Exam Time and Date: 1:30-3:30 p.m., Saturday, December 19

Liberal Education

ESPM 3601/HSG 3482 is approved for the Technology and Society Theme. This is part
of the Liberal Education requirements at the University of Minnesota. The value of the
Liberal Education courses is that they provide a perspective and context beyond the focus
of your major. It is important to understand that a University education is more than
specialized training in narrowly focused topics. Rather, this education should be a
catalyst for a long pathway of continuing, lifelong education. Moreover, the Liberal
Education is an opportunity to appreciate different perspectives for a greater
understanding of the many challenging issues that graduates in the 21st century will
encounter.

Student Learning Outcomes _____

1. Can identify, define, and solve problems

      Students should be able to identify and describe problems and opportunities
related to new technological developments in housing. These developments could be
related to new building materials, building designs, or energy systems as they relate to

housing.

Evaluation:

In the course exams, students will be provided with examples of new technology. They will need to evaluate the implications of this technology as it relates to energy, consumption, building durability, and occupant health.

2. Can locate and critically evaluate information

As part of the technical poster presentation, student groups will be required to identify at least four technical publications. They must evaluate these sources. They will then be required to include these sources in their poster presentation.

Evaluation:

Grading of the poster presentations will be conducted by faculty and professionals with a background in housing and building science. The evaluation protocol will assess the technical understanding of the material, the technical publications and the interpretations of this information, as well as the relevance and insightfulness of the poster presentation conclusions.

4. Understanding diverse philosophies and cultures within and across societies

Housing issues bring together conflicting and diverse forces in society. Many citizens want "the American dream" -- a sustainable, efficient, affordable home, along with quiet streets, green space, and short commutes. However, developers strive to provide these homes with the most cost-efficient means possible. Often there are environmental consequences such as sprawl and altered ecosystems. These consequences diminish the quality of the homeowner's lifestyle.

Evaluation:

Class discussion periods will focus on the diverse philosophies and viewpoints related to housing and development. Student groups will be asked to represent these divergent positions as part of the discussion. This will constitute part of the student participation grade.

7. Have acquired skills for effective citizenship and life-long learning

Good stewardship of the environment is good citizenship. A home, as shelter, is a fundamental need, and it is a laboratory for the exploration of humans' impact on the environment. Our homes are also a symbol of our lifestyles and consumption habits. There is a need to reflect on the most ethical ways that we can use our technology for the development of sustainable communities within the greater natural environment.

Moreover, as technologies change and environmental and social consciousness evolves, there is an increasing need to embrace the tenets of life-long learning, especially after graduation and the completion of the university education. [We have the technology to build roads to most anyplace, flatten mountains, and fill in wetlands, but how can we use this power in the most responsible (ethical) way to have the least impact on the natural world?]

Evaluation:

The format for the exams and the requirements for the technical poster presentation stress the role of technical innovation and good stewardship as responsibilities or good citizenship.

Technology and Society Theme

Advances in the technology used in housing, both materials and design processes, have had a significant impact on the houses and communities in recent years. Currently we are able to build houses faster and cheaper than in past times. We can build in more remote landscapes and can remake the landscape to suit our housing objectives (for better or worse…). Unfortunately, these technological advances have not uniformly led to better houses or better community development. Thoughtful consideration of the technology and the implications of this technology are certainly appropriate.

It is important that students become aware of the technological advancements related to housing: their impact on the housing industry and their opportunities (some realized and some not…), as well as the problems caused by these technological advancements (filling in wetlands, building on floodplains). There is a need to reflect on the most ethical ways that we can use this technology for the development of sustainable communities within the greater natural environment. [We have the technology to build roads to most anyplace, flatten mountains, fill in wetlands, but how can we use this power in the most responsible, (ethical) way to have the least impact on the natural world.]

Developments in building materials and building technology provide us with the opportunity for housing that is energy-efficient, durable and very healthy for occupants. The promise and opportunities are very real. However, the delivery of new and remodeled houses is problematic: builders and developers as well as the housing market have not come together to demand and define this product. Moreover, the human factors related to the management of the house are uncertain: maintenance, living habits, and management practices are undefined and not uniform.

The housing boom following WWII was facilitated by significant technological advancements in the earthmoving equipment as well as the manufacturing process of homebuilding. Looking back at this suburban growth, it is important to be thoughtful and reflective of the role that technology played (good & bad) to make this development happen. Clearly the housing crisis following WWII was solved and the affluence and comfort of the post-war generation has benefited by this development. At the same time, the benefits and disadvantages of suburban sprawl are still debated.

As well as understanding the societal context of recent housing technology developments, it is also important for students to learn a more in-depth appreciation for some of the basic scientific and engineering factors that are critical to drive the advancement in more energy efficient, more structurally sound, and more durable housing. Resistance to hurricanes, cold weather, or driving rain does not result from simply thicker walls and roofs, rather, these advancements are engineered into the product based on scientific principles and product testing.

Courses must meet these criteria:

The course examines one or more technologies that have had some measurable impact on contemporary society.

Advances in insulation and air sealing to save energy and increase durability will be assessed. These advances have caused a fundamental change in the technology for building houses as well as the homeowner expectation of the performance of newer houses.

The course builds student understanding of the science and engineering behind the technology addressed.

The course will document the development of building science as a discipline and the reliance on the fundamental principles of heat and mass transfer. Based on these scientific developments, the subsequent engineering has led to the building technologies that are currently recommended for new home construction.

Students discuss the role that society has played in fostering the development of technology as well as the response to the adoption and use of technology.

Students will learn how the recognition, by society, of energy shortages and the concerns about occupant health and building durability have fostered the analysis / research that has led to the technological developments critical to building science.

Students consider the impact of technology from multiple perspectives that include developers, users/consumers, as well as others in society affected by the technology.

This course also looks at the sources for energy used for our homes and society. To satisfy this requirement, students will examine the technology required for energy extraction (fossil, nuclear and renewable fuels). They will consider new technological developments (mining tar sands and carbon sequestration) and the choices that society must make about these developments.

Students develop skills in evaluating conflicting views on existing or emerging technology.

Students will evaluate the types of renewable energy technology that are being developed for homes and businesses. They will also assess the role of energy conservation and the technology required for energy conservation. They will consider the short-term and long-term implications of adopting this technology.

Students engage in a process of critical evaluation that provides a framework with which to evaluate new technology in the future.

With the development of new products as well as new technologies, it is critical to use a disciplined and unbiased system to evaluate the long-term implications. Students will consider these types of analysis: cost/benefit analysis, encumbered

energy, and life cycle analysis, as ways to make these evaluations.