



Engineering & Technology Department  
Fall River, Massachusetts

Course Number, Section, CRN & Title:

EGR 102-34H Introduction to Sustainable and Green Energy Technologies

Instructor:

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Required Text:

**Introduction to Renewable Energy, Vaughn Nelson, 2011, CRC Press  
ISBN#: 978-1-4398-3449-7**

*Sustainable Energy Without the Hot Air, David JC MacKay, 2008, UIT*

**Free on-line book at the following web site:**

<http://www.withouthotair.com/about.html>

Optional – Referenced Texts:

*The Renewable Energy Handbook, William H. Kemp, 2009, Aztext, Press, Taylor and Francis Group, ISBN#: 978-0-9810132-1-3*

*The Renewable Revolution, Sajed Kamal, 2011, Earthscan, ISBN#: 978-1-8497-1195-1*

*The Sustainability Revolution, Andres R. Edwards, 2007, New Society Publishers, ISBN#: 13-978-0-86571-531-8*

Class Times & Locations:

In Person Lecture/Lab: 4:15- 6:40pm

Room: B222

Date Range: 1/22/2014 thru 3/ 12/2014

On Line Lab  : <http://bristolcc.angellearning.com/default.asp>

I. Course Description & Rationale:**Description:**

This course is designed to introduce students to emerging renewable energy technologies and sustainable building design practices. Both the practical applications and underlying theories will be addressed. Topics will include: The Construction/Engineering Design & Implementation Process, Green Building Practices especially those related to Energy Efficiency, Environmental Conservation and Resource Management, Wind Turbines, Solar Energy and other forms of renewable energy.

**Rationale:**

Energy is becoming increasingly more important in the economic development of our societies. The combination of limited fossil and nuclear fuel supply together with concerns on pollution and global warming has put the development of clean and renewable energy to the forefront of future human endeavor. It has long been recognized that human activities are the cause of many global problems, such as air and water pollution, global warming, fuel shortage, etc., that we face today, and if unchecked, can bring disastrous outcomes to the globe and human beings. In addition, the limited fossil fuel resources and its impact on economy and national security point to an urgent need to develop alternative renewable energy sources.

Sustainability, i.e., the ability to achieve economic prosperity while protecting the natural systems of the planet, and providing a higher quality of life for its people, is a crucial issue for all nations now and for the foreseeable future. As the recent energy shortage and energy price increase indicate, renewable energy will be at the forefront of the effort to develop a sustainable economy.

Engineers of the future will have to grapple with this energy problem for a long time to come, whether they want to or not, and it is important that the colleges prepare them for this task, and this course is offered for this exact purpose.

II. Course Requirements:

The Student is required to review weekly assignments and lecture notes, and complete assigned reading, laboratory presentations and homework problems. **Three hours of out of class study per class/laboratory hour should allow students to be adequately prepared for class and complete these requirements.** Homework and Laboratory Presentations will follow a prescribed format and should be neat and organized. The following grading breakdown will be used:

On Line Activity/Participation:	15%
Class Attendance/Participation:	10%
Sustainability Assignment:	10%
Home PV Feasibility Study:	20%
Home Wind Feasibility Study:	10%
Renewable Energy Lab Assignment:	5%
Wind Lab Assignment:	5%
Final Project/Exam	20%
Self-Assessment	5%
<u>Extra Credit:</u> Water Resources	
Graded Assessment:	5%

### III. Course Objectives

1. To introduce students to the architectural and engineering profession and how green technology is used in its branches.
2. To introduce students to sustainability and describe the environmental, economic, and social aspects of the triple bottom line on development projects.
3. To describe the profound impact humans have had on the ecosphere, and explain the importance of biodiversity and ecosystem services and the impact development on such systems.
4. To differentiate between renewable and nonrenewable energy sources, and identify the key components of the green economy.
5. To emphasize the math and science principles used to design, develop, test, and supervise production/construction.
6. To provide an understanding of different fields of renewable energy.
7. To provide an understanding of different fields of green building practices.
8. To provide an understanding of different fields of environmental conservation.
9. To introduce students to basic engineering principles and physical laws that they will use in their education and/or profession.
10. To emphasize the importance of team work, oral, graphic and written communication in green technology fields.

### IV. Teaching Methodology:

The following approaches will be used in teaching this course: lecture, on-line, discussion, interactive computing, and open question and answer. Visual aids will be used when ever possible to reinforce key concepts. Student learning will be assessed with in-class exams, projects, presentations, reports and class participation. In class discussion will be encouraged, students are expected to read materials before class and be prepared for class discussions. Students will be responsible for written assignments, individual and group projects, oral presentations, assignments, and exams. Participation in class and in the performance of the laboratory experiments is required and will be reflected in the final grade.

As an **eight week hybrid on line class**, this will be a non-traditional classroom experience and students should be prepared to spend a minimum of 9 hours a week on reading, on-line lessons and on course assignments. While you may feel that a great deal of content is delivered on a weekly basis remember that in a traditional weekly course you would be coming to class for 3 hours and then spending an additional 3 hours (at least) outside of class on assignments and reading. In this hybrid online course format it is expected that you will be spending those out of class time on your own working on the concepts that you would usually get in a live lecture. Please be sure to budget your time accordingly!

**V. Attendance Policy:**

In accordance with the attendance policy of the college, attendance is mandatory and will be taken at each class. Students should arrive for class on time (All late arrivals will require an explanation!) and in a prepared manner (this includes the text). While in class, students should be courteous to the instructor and their fellow students (No Cell Phones/Pagers). If an absence is unavoidable it should be discussed with the professor prior to the class and an alternate assignment will be determined. Any excessive or unexplained absences in excess of **six hours** of class time and/or no online weekly participation may result in withdrawal or failure of this course.

All assignments are due on the day collected regardless of attendance. Assignments will be penalized 10% per school day late. Assignments will not be accepted more than one week late. Please take advantage of the on-line calendar tools, so as to keep on schedule with course deliverables.

**VI. Academic Misconduct:**

You (the student) are expected to practice academic honesty in every aspect of this course, and all other courses. Make sure you are familiar with the policies of the State of Massachusetts and this College; See the Student Code of Conduct (in the Student Handbook), BCC's Academic Integrity Policy (<http://www.bristolcc.edu/Academics/integrity/index.cfm>) and Student Academic Rights & Responsibilities (in the Academic Catalog). Students who engage in academic misconduct are subject to school disciplinary procedures.

**VII. Disability Accommodations:**

Bristol Community College complies with federal legislation for individuals with disabilities (Section 504 of the Rehabilitation Act of 1973 and the Americans With Disabilities Act of 1990) and offers reasonable accommodations to qualified students with disabilities. It is your responsibility to notify me and the Office of Disability Services of your need for classroom accommodations. Accommodations are arranged through the Office of Disability Services/ODS, which will issue a confidential Disability Services Accommodation Form. This should be accomplished, when possible, during the first two weeks of class. If you have questions about the process, please contact ODS by calling (508) 678-2811 x2955 or stopping by B104. You may also contact ODS online at [http://www.bristol.mass.edu/Students/ods/request\\_forms/ods\\_contact\\_us.cfm](http://www.bristol.mass.edu/Students/ods/request_forms/ods_contact_us.cfm)

VIII. On Line Course Notes:**Hybrid Format Rationale:**

One advantage of the hybrid online format is the ability to include a great deal of informational content, such as graphic images, video clips etc... Hopefully, they will make the subject more interesting and the material easier to understand. Students learn best in quite different ways. One of the advantages of the hybrid online format of the course is that it allows students to approach the course in ways that suit their personal styles and preferences. This course by design specifically accommodates different learning styles by involving a variety of components, including text, a wealth of images, video clips, self-check quizzes, reference lists and online discussion. Since, you may not be accustomed to designing your own learning strategy, it might take a little time to do that and to settle into a comfortable routine. Therefore, I suggest you start the on line component early. This will give you time to figure out on your own the best way to learn the material.

**On Line Confidentiality Policy:**

Students are asked to try to form conceptual links between the course material and their own personal experiences in class discussions, because this is an excellent way to learn new material. Therefore, confidentiality must be guaranteed to all students in order to provide a safe learning environment. No student should ever repeat class discussions or allow people outside the class to access our password protected course Website or read printed versions of any student's posts. Be sure to discuss only information you wouldn't mind being made public in case anyone violates this confidentiality rule.

**Plagiarism Policy:**

Students must cite all sources of information in posts, essays, or papers and provide references to them. Using ideas or words written or spoken by another person without providing a citation and reference for the source is plagiarism and will not be tolerated in this course.

**Civility Policy:**

I am committed to developing and actively protecting a class environment in which respect must be shown to everyone in order to facilitate and encourage the expression, testing, understanding, and creation of a variety of ideas and opinions. Rude, sarcastic, obscene, or disrespectful posts have a negative impact on everyone's learning and will not be tolerated. Please refer to the college's **netiquette policy** for more information on acceptable behavior and interaction in the online course environment.

**Technical Help:**

If you have any technical problems or questions about eLearningBCC please visit the BCC Wiki: <http://dl.bristol.mass.edu/wiki>. If you require additional assistance or have other questions please contact the distance learning help desk by calling (508) 678-2811 x3333 or send an email to [distancelearning@bristol.mass.edu](mailto:distancelearning@bristol.mass.edu).

**Discussion Boards:**

I highly encourage students to read and respond to postings from their classmates. Part of the nature of this class is for students to help each other troubleshoot problems and develop critical-thinking skills and working through questions on the forum is an excellent method to develop proficiency in these areas. Discussion board postings are an integral part of the course. As the attendance policy states, you must post your own responses weekly to the discussion board and must read and respond to at least one other student's posting. Responses must be more than "I agree." They should be substantive and should reference reading assignments, web references, lecture notes or outside resources.

IX Course Outline:

The schedule is subject to change with fair notice and the notice will be made available.

Class	Date	Topics	Projects Assignments & Readings	Online Lesson
1	1/22	<ul style="list-style-type: none"> <li>• Sustainability</li> <li>• Green Building</li> <li>• Systems Thinking</li> </ul>	Read Nelson, Chapter 1, Introduction; Read Nelson, Chapter 2, Energy	<b>Class 1 Lessons:</b> Sustainability Research
2	1/29	<ul style="list-style-type: none"> <li>• Renewable Energy</li> </ul>	Read Nelson Chapter 3, Sun; <b>**Sustainability Report Due</b>	<b>Class 2 Lessons:</b> Renewable Energy
3	2/5	<ul style="list-style-type: none"> <li>• Solar Thermal</li> </ul>	Read Nelson Chapter 4, Heat Transfer & Storage; Read Nelson Chapter 5, Solar heating & Cooling <b>**No in person class</b>	<b>Class 3 Lessons:</b> Passive and Active Solar Thermal Systems
4	2/12	<ul style="list-style-type: none"> <li>• Photovoltaic (PV) Systems – Renewable Energy Lab</li> </ul>	Read Nelson, Chapter 6, Photovoltaic; Read Nelson, Chapter 7, Concentrating Solar Power <b>**Colaborative LAB Assignment</b>	<b>Class 4 Lessons:</b> Photovoltaic (PV) Systems
5	2/19	<ul style="list-style-type: none"> <li>• Site Design</li> </ul>	Read Nelson, Chapter 8, Solar Systems <b>**PV Feasibility Report Due</b> <b>**No in person class</b>	<b>Class 5 Lessons:</b> Site Design for Energy Savings
6	2/26	<ul style="list-style-type: none"> <li>• Wind Systems -Lab</li> </ul>	Read Nelson, Chapter 9, Wind Energy <b>In Class Wind Lab Kit Competition</b> <b>**Submit Final Project Abstract Due</b>	<b>Class 6 Lessons:</b> Wind Systems
7	3/5	<ul style="list-style-type: none"> <li>• Bioenergy</li> <li>• Geothermal</li> <li>• Hydro/Water Systems</li> </ul>	Read Nelson Chapter 10, Bioenergy; Read Nelson, Chapter 11, Geothermal <b>**Wind Feasibility Report Due</b> <b>Extra credit:</b> Read Nelson, Chapter 12, Water	<b>Class 8 Lessons:</b> Geothermal Heating and Cooling Systems <b>Extra credit:</b> <b>Class 7 Lessons:</b> Managing Water Resources
8	3/13	Finals	<b>Final Project Presentation</b> <b>Self-Assessment</b>	<b>Extra Credit:</b> Hand in Week 8 Water Resources Graded Assessment

*This Syllabus is provided for informational purposes regarding the anticipated course content and schedule of this course. It is based upon the most recent information available on the date of its issuance and is as accurate and complete as possible. The instructor reserves the right to make any changes deem necessary and/or appropriate. The instructor will make the best efforts to communicate any changes in the syllabus in a timely manner. Students are responsible for being aware of these changes.*