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MET CS-504 Green Information Technology

Syllabus

Location: Fuller Building
808 Commonwealth Ave
Room: AAR

Day and Time: Tuesdays 6 – 9 pm

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Computer Science Department
Metropolitan College
Boston University

1.   Course Overview

1.1   Description from Course Catalog

CS-504 Green Information Technology (Green IT)

This course empowers students to reduce the energy use, waste, and other environmental impacts of IT systems while reducing life cycle costs, thereby improving competitive advantage. Students learn how to measure computer power usage, minimize power usage, procure sustainable hardware, design green data centers, recycle computer equipment, configure computers to minimize power, use virtualization to reduce the number of servers, and other green technologies. Students also learn how to make green IT an integral part of organizational culture and planning, to foster long term sustainable information technology. The course is executed through a combination of lectures, guest lectures, field trips, assignments, labs, case studies, and a term project.

1.2 Introduction

"These days, it seems like everyone wants to "go green." But it's not just a fad; there are many great reasons why it is in our collective best interests to conserve, to be kinder to Mother Earth, and to make the most of what this amazing universe provides us. It's become quite clear that all we create and all we consume can deeply affect our lives, now and in the future." [1] This Green Information Technology course is about looking through your "sustainability lens" and determining the right IT solutions that not only make sense for the environment (planet), but also for the rest of the "triple bottom line"[2], profits, and people.

2. Basic Information

2.1 Schedule

Classroom:	**Fuller PC Labs**
Day and Times:	**Tuesdays 6-9pm**

2.2 Instructor:

David Shirley

Mr. Shirley is an adjunct faculty member of Boston University's MET College, and has been teaching and developing courses for the past ten years. He has been teaching graduate level courses in Project Management, Corporate Social Responsibility, and Environmental Issues. He has more than 30 years of management experience in the areas of construction, the environment, and telecommunications. Mr. Shirley accepted and early retirement in 2001 from a major telecommunications company where he held the position of Project and Program Management Director. As well as an educator and course developer, Mr. Shirley is a consultant and trainer in the fields of sustainability and project management, co-authoring a book, *Green Project Management*, winner of the 2011 David I Cleland Award for Excellence in Project Management Literature, (CRC Press @2010) and authoring *Managing Projects in Healthcare* (CRC Press @2011).
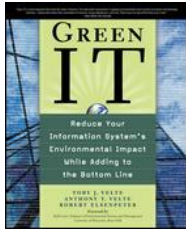
Contact: **dshirley@bu.edu** **Virtual Office – Office hours as needed.**
(207) 363-5492 (before 9pm)

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[1] Velete, et al, *Green IT*, McGraw Hill, ©2008, pg. xxi.
[2] The phrase was first coined by John Elkington is his 1998 book, *Cannibals with Forks: the Triple Bottom Line of 21st Century Business.*

3.   Text & Materials

3.1   Required Texts

"Green IT – Reduce Your Information System's Environmental Impact While Adding to the Bottom Line"

First Edition
by Toby J. Velete, Anthony T. Velete, Robert Elsenpeter
Publisher: McGraw-Hill
Copyright Year: 2008
ISBN: 978-0-07-159923-8
Pages: 307

"The Greening of IT – How Companies Can Make a Difference for the Environment"

by John Lamb
Publisher: IBM Press
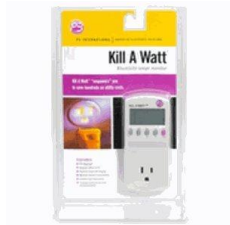**Copyright Year:** 2009
ISBN: 978-0-13-715083-0

3.2 MS Word and MS Power Point
These products will be used throughout the course and students are required to use them. Alternatives such as OpenOffice are acceptable, but the student bears the responsibility for completing the work.

3.3 Required Instrument
An electricity monitoring instrument will be **required** for this class. P3 International P4400 Kill-A-Watt Electricity Usage Monitor is recommended as it is fully functional and is relatively

inexpensive. However, any instrument that can measure electrical consumption, display volts, amps, and wattage within 0.2% accuracy, and is designed for use with AC 115-volt appliances is acceptable. **You will need to obtain this instrument and become familiar with its operation prior to the start of class**.

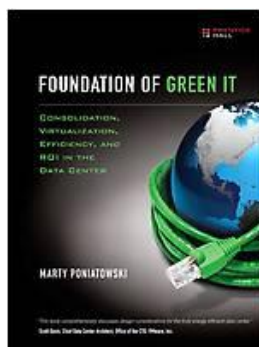### 3.4 Recommended Text
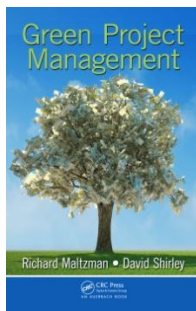
"Green Project Management"

by Richard Maltzman and David Shirley
Publisher: CRC Press a Taylor and Francis Company
Copyright Year: 2010
ISBN: 978-1-4398-3001-7
Pages: 272

"Foundation of Green IT"

by Marty Poniatowski
Publisher: Prentice Hall
Copyright Year: 2009
ISBN: 978-0-13-704375-0
Pages: 320

3.5   Blackboard 8

This course will use a Blackboard 8 site. Students are required to have a BU ID and password to log in. If you do not have a BU ID yet, note that this takes some time so be sure to start this process well before class starts. The site is:

http://blackboard.bu.edu/

4.   Course Learning Objectives

4.1   Course Goals and Objectives

This course empowers students to reduce the energy use, waste, and other environmental impacts of Information Technology (IT) systems while reducing life cycle costs, thereby improving competitive advantage. Students learn how to measure computer power usage, minimize power usage, procure sustainable hardware, design green data centers, recycle computer equipment, configure computers to minimize power, use virtualization to reduce the number of servers, and other green technologies.

Students will:
- Assess enterprise-wide and personal computing and computing related energy consumption.
- Acquire expertise for improving the energy efficiency of personal computers by reducing the power consumption requirements.
- Choose the best sustainable hardware for their applications.
- Evaluate the regulatory and governance issues surrounding IT.
- Recognize the necessity for long-term sustainability in IT.
- Formulate plans for reducing IT heating and cooling requirements.
- Execute a virtualization plan.

In pursuing these objectives, the course will:
- Use textbooks, lectures, and cases
- Conduct guest lectures and field trips
- Require a term project as well as assignment and labs.

4.2   Course Learning Objectives

After successfully completing this course, students will be able to:
- Explain why Green IT is important to the enterprise over all and the bottom line specifically
- Conduct basic equipment usage audits
- Perform virtualization and cloud computing fundamentals
- Improve the energy efficiency of their personal computing environment as well as the enterprise-wide computing environment

4.3   Course Expectations and Delivery Mode

The course will be executed by means of a sequence of lectures, guest lectures, classroom discussions, field trips, assignments, case studies, quizzes, a comprehensive examination, and a term project.

Every student will be expected to contribute every week. There is a semester-long **Term Project**. Students will be required to demonstrate their understanding of the key features of the course, as well as the practical application of tools and techniques.

4.4   Schedule

a)   Class Schedule

CS-504 Schedule

Date	Readings	Topic
Week 1 1/17/12	Velete: Chapter 1 (all) Lamb: Chapter 1 (all) Chapter 2 (15-30)	The Importance of Green Information Technologies
Week 2 1/24/12	Velete: Chapter 2 (all) Lamb: Chapter 3 (all) Chapter 4 (all)	Governance and Regulatory Issues
Week 3 1/31/12	Velete: Chapter 3 (all) Lamb: Chapter 2 (30-37) Chapter 7: (109-115)	Minimizing Power Usage
Week 4 2/7/12	Velete: Chapter 4 (63-75) Lamb: Chapter 8 (all)	Cooling
Week 5 2/14/12	Velete: Chapter 5 (all) Lamb: Chapter 3 (all)	Business Process Reengineering for Sustainability
2/21/12	**NO CLASS**	
Week 6 2/28/12	Velete: Chapter 6 (all)	Going Paperless
Week 7 3/6/12	Velete: Chapter 7 (all)	Recycling

SPRING	**BREAK NO CLASSES**	
Week 8 3/20/12	Velete: Chapter 8 (all)	Sustainable Hardware
Week 9 3/27/12	Velete: Chapter 9 (all) Lamb: Chapter 11 (all)	Technology Company Case Studies
Week 10 4/3/12	Velete: Chapter 10 (all) Lamb: Chapter 10 (all) Chapter 11 (all)	University and Other Case Studies
Week 11 4/10/12	Velete: Chapter 11 (all) Lamb: Chapter 7 (115-121)	Data Center Design and Redesign
Week 12 4/17/12	Velete: Chapter 12 (all) Lamb: Chapter 6 (all)	Virtualization
Week 13 4/24/12	Velete: Chapter 13 (all)	Managing Your Green IT Transformation
Week 14 5/1/12	Velete: Chapter 14 (all) Lamb: Chapter 12 (all) Appendix A	The Future: Staying Green
	FINAL EXAM	

4.5 Assignments

1. Term Project

The objective of the **Term Project** is for each student to gain substantial experience with some topic in the broad area of green IT. Some examples of a term project to consider are:
- develop a comprehensive long-term sustainability plan
- a detailed analysis of the cooling system of an IT facilities
- develop a virtualization plan and analysis of the benefits of the plan

However, the subject of the Term Project is up to the individual as long as the project focuses on the intersection of Information Technology and sustainability.

The Term Project should follow the APA or similar format. For an example you can go to:

http://owl.english.purdue.edu/owl/resource/560/01/

Week 2 you will be required to submit, via the **Digital Drop Box**, the conceptual idea of your project.

Week 3 you will be required to submit, via **Digital Drop Box**, your project plan that should include, at a minimum, your purpose and objectives, assumptions, and a schedule of milestones that will ultimately product the final deliverable, your project.

One short class presentation beginning Week 13 will be required of each student.

2. **Research Assignments**

The object of the **Research Assignments** (RA) is for the student to investigate various topics and prepare a summary of findings and recommendations for improvements. *You will be required to post them in the appropriate Blackboard Forum area, and also be prepared to discuss your findings in class.*

CS-504 Homework Assignment Schedule
*See Class Schedule for Reading Assignments

Due Date	Assignment
Week 1 1/17/12	1. Research an organization's IT sustainability. (RA) 2. Throughout the semester you will be using your electrical usage monitor to measure electrical usage of different IT related devices. You will be required to keep a journal of those measurements which will be turned in to the instructor in Week12. In Week 1 gather some baseline information on the peak power usage of your personal computer(s) and peripherals. For extra credit find a laser printer and measure its power usage
Week 2 1/24/12	1. Research an organization's IT and sustainability governance. (RA) 2. **Prepare and submit your Term Project's conceptual proposal.** 3. Start measuring the different electrical output states of your computer(s) and peripherals, e.g. during standby mode.
Week 3 1/31/12	1. Research an organization's IT power usage and identify ways to reduce it. (RA) 2. **Submit Term Project plan – including deliverables** 3. Continue finding creative ways to measure power output of your computer(s) and peripherals e.g. pull battery on laptop and measure charging requirements.

Week 4 2/7/12	1. Research the sustainability of an organization's IT cooling. (RA)
Week 5 2/14/12	1. Research and identify business process changes that will improve the IT sustainability of an organization. (RA)
2/21/12	**NO CLASS**
Week 6 2/28/12	1. Research the sustainability of paper use in an organization. (RA)
Week 7 3/6/12	1. Research an organization's and your local municipality's recycling efforts. Particularly focus on the way they handle e-waste (RA)
SPRING	**BREAK NO CLASSES**
Week 8 3/20/12	1. Research your organization's EPEAT, RoHS and EnergyStar policy and status. (RA) 2. Lab: Use one of the EPEAT or EnergyStar tools to evaluate the sustainability of one or more computer systems.
Week 9 3/27/12	1. Using the readings as a guideline, research an organization's IT sustainability plan and summarize it along with your recommendations on how to improve it. It can be *2-3 pages* long. – **Paper Due**
Week 10 4/3/12	1. Analyze another organization's IT sustainability.
Week 11 4/10/12	1. Develop a more sustainable design an organization's data centers. Submit your proposal with justifications and it can *3-4 pages* long. – **Paper Due**
Week 12 4/17/12	1. Research a virtualization solution either Microsoft's solution, VMware's solution or other solution. (RA)
Week 13 4/24/12	1. **Term project are due.** 2. Term project presentations.
Week 14 5/1/12	1. Term project presentations.

4.6   Course Grading

Assignment	Percentage
Class Contribution	5
Term Project	20
Presentation	5
Assignments/Labs	20
Quizzes	25
Final	25
Total Points	100

While there is no fixed absolute number of grades in any one level it is important to note that high grades reflect an excellence in the understanding of class material and organization of thought. In addition, an important aspect of any class is the shared thoughts and insights of the class members. Grades will also reflect an individual's contributions to the class.

4.7   Homework, Exams, Quizzes and Discussions

Assignments are due as noted on the attached Homework Assignment Schedule.   All assignments are to be handed in on the date indicated, using the requirements indicated with the assignment. No email submission.

Late assignments will be penalized. Please keep within stated page limits.

There will be a closed book short quiz at the end of each class that will cover the material presented during that class.

There will be a comprehensive final exam during the scheduled examination time during exam week.

Part E: Policies

5.   Requirements, Policies and Standards

5.1   Attendance
Attendance at all classes is mandatory. Attendance will be taken early on in the class. In accordance with the department policy, any student missing more than 2 classes will be considered to have withdrawn. Students arriving late will be considered to have missed the class.

5.2   Homework
Homework will be assigned per the schedule. Some assignments will be graded. Proper attribution is required for sources.

5.2.1 Timely Presentation of Materials Due

All assignments (papers, homework, etc.) have due dates. These are the LAST DATES that stated material is due. I maintain the right to refuse, or downgrade, any materials presented after due dates. This is not a subject for discussion.

Student should organize their time and work so as to turn in the assignment before the due date. To be absolutely clear, this means that the work will be accepted anytime up to that date but not after. Students should develop a schedule so that the work is built around their personal needs and obligations. Students should allow for contingencies and plan to hand in their work well before the last minute. That way, should some unforeseen problem arise, the timely presentation of work is not in jeopardy.

5.2.2 Discussion Expectations

Each student should be prepared to discuss the assigned topic in class.

5.2.3 Student Preparation

Minimal preparation is reading the material, and being able to summarize what it is about, what the major issues are, and some recommendations.

Superior preparation involves being able to (i) summarize the situation or problem presented by the case; (ii) recommend a solution to the discussed problem; (iii) support your recommendation with data, relevant details, and analyses; and (iv) discuss innovative solutions, or why obvious solutions might be discounted.

5.3.4 Requests For Extensions

The General position is that make up extensions are not given. There is no guarantee that a make up will be permitted, and any request needs to be in writing and a written verification of the incident will be expected. Sometimes, unfortunate situations occur that make fulfilling requirements impossible and, as such, requests for extensions will be evaluated on a case-by-case basis.

This is not to penalize any individual student but to attempt to assure that there is a level playing field and the total class feels confident that no one has a unique advantage.

If, for any reason, you are unable to meet any assignment deadline, a student should contact the instructor immediately, and preferably in advance. All assignments must be completed.

5.3.2 Off-Syllabus Work

Students are encouraged to consider issues that are beyond those defined in the syllabus to include in their research papers, class discussions, and term projects within the intersection of information systems and sustainability.

6.   Academic Conduct Policy

The academic conduct policy is summarized below. For the full text of the academic conduct code, please go to:

http://www.bu.edu/met/metropolitan_college_people/student/resources/conduct/code.html

Any Plagiarism will be dealt with according to the Academic Conduct Code of Metropolitan College.

Boston University makes available to all faculty the plagiarism tool "Turnitin.com." The site contains millions of papers from around the world. When a paper is submitted to Turnitin.com, it is analyzed and compared to other work. Turnitin.com reports if any parts of the paper are copied from other sources without proper attribution. Specifically, TurnItIn.com will detect plagiarism.

6.1   A Definition of Plagiarism

"The academic counterpart of the bank embezzler and of the manufacturer who mislabels products is the plagiarist: the student or scholar who leads readers to believe that what they are reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone's mind, there would be no need for the explanation that follows; merely the warning with which this definition concludes would be enough. But it is apparent that sometimes people of goodwill draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of "borrowing" and of the procedures for correct identification of materials other than those gained through independent research and reflection."

"The spectrum is a wide one. At one end there is a word-for-word copying of another's writing without enclosing the copied passage in quotation marks and identifying it in a footnote, both of which are necessary. (This includes, of course, the copying of all or any part of another student's paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so aptly expresses one's opinion that one is tempted to make it personal property."

"Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit-but more the result, perhaps, of laziness than of bad intent-is the patching together of random jottings made in the course of reading, generally without careful identification of their source, and then woven into the text, so that the result is a mosaic of other people's ideas and words, the writer's sole contribution being the cement to hold the pieces together. Indicative of more effort and, for that reason, somewhat closer to honest, though still dishonest, is the paraphrase, and abbreviated (and often skillfully prepared) restatement of someone else's analysis or conclusion, without acknowledgment that another person's text has been the basis for the recapitulation."

The above paragraphs are from H. Martin and R. Ohmann, The Logic and Rhetoric of Exposition, Revised Edition. Copyright 1963, Holt, Rinehart & Winston.

6.2   Academic Conduct Code

I.   Philosophy of Discipline
The objective of Metropolitan College in enforcing academic rules is to promote the kind of community atmosphere in which learning can best take place. This atmosphere can be maintained only so long as every student believes that his or her academic competence is being judged fairly and that he or she will not be put at a disadvantage because of the dishonesty of someone else. Penalties imposed should be carefully determined so as to be no more or no less than required to maintain the desired atmosphere. In defining violation of this code the intent is to protect the integrity of the educational process.

II.   Academic Misconduct
Academic misconduct is conduct by which a student misrepresents his or her academic accomplishments or impedes other students' chances of being judged fairly for their academic work. Knowingly allowing others to represent your work as theirs is as serious an offense as submitting another's work as your own.

III.   Violations of this Code

Violations of this code comprise attempts to be dishonest or deceptive in the performance of academic work in or out of the classroom, alterations of academic records, alterations of official data on paper or electronic resumes, or unauthorized collaboration with another student or students. Violations include, but are not limited to:

1. **Cheating on examination**. Any attempt by a student to alter his or her performance on an examination in violation of that examination's stated or commonly understood ground rules.
2. **Plagiarism.** Representing the work of another as one's own. Plagiarism includes but is not limited to the following: copying the answers of another student on an examination, copying or restating the work or ideas of another person or persons in any oral or written work (printed or electronic) without citing the appropriate source, and collaborating with someone else in an academic endeavor without acknowledging his or her contribution. Plagiarism can consist of acts of commission-appropriating the words or ideas of another-or omission failing to acknowledge/document/credit the source or creator of words or ideas (see below for a detailed definition of plagiarism). It also includes colluding with someone else in an academic endeavor without acknowledging his or her contribution, using audio or video footage that comes from another source (including work done by another student) without permission and acknowledgement of that source.
3. **Misrepresentation or falsification of data** presented for surveys, experiments, reports, etc., which includes but is not limited to: citing authors that do not exist; citing interviews that never took place, or field work that was not completed.
4. **Theft of an examination**. Stealing or otherwise discovering and/or making known to others the contents of an examination that has not yet been administered.
5. **Unauthorized communication during examinations**. Any unauthorized communication may be considered prima facie evidence of cheating.

6. **Knowingly allowing another student to represent your work as his or her own**. This includes providing a copy of your paper or laboratory report to another student without the explicit permission of the instructor(s).
7. **Forgery, alteration, or knowing misuse of graded examinations, quizzes, grade lists, or official records of documents**, including but not limited to transcripts from any institution, letters of recommendation, degree certificates, examinations, quizzes, or other work after submission.
8. **Theft or destruction of examinations or papers** after submission.
9. **Submitting the same work in more than one course** without the consent of instructors.
10. **Altering or destroying another student's work or records**, altering records of any kind, removing materials from libraries or offices without consent, or in any way interfering with the work of others so as to impede their academic performance.
11. **Violation of the rules governing teamwork**. Unless the instructor of a course otherwise specifically provides instructions to the contrary, the following rules apply to teamwork: 1. No team member shall intentionally restrict or inhibit another team member's access to team meetings, team work-in-progress, or other team activities without the express authorization of the instructor. 2. All team members shall be held responsible for the content of all teamwork submitted for evaluation as if each team member had individually submitted the entire work product of their team as their own work.
12. **Failure to sit in a specifically assigned seat during examinations.**
13. **Conduct in a professional field assignment that violates the policies and regulations of the host school or agency.**
14. **Conduct in violation of public law occurring outside the University that directly affects the academic and professional status of the student, after civil authorities have imposed sanctions.**
15. **Attempting improperly to influence the award of any credit, grade, or honor.**
16. **Intentionally making false statements to the Academic Conduct Committee or intentionally presenting false information to the Committee.**
17. **Failure to comply with the sanctions imposed under the authority of this code.**

When an alleged Infraction occurs in a School/College other than the one in which the student is enrolled, the initial determination of misconduct will be made by the Academic Conduct Committee of the school/college where the alleged infraction occurred, while assessment of penalty will come from the student's school/college of enrollment, based upon recommendation of the Dean and Committee from the school/college where the infraction took place.