ILLINOIS INSTITUTE
OF TECHNOLOGY

Course Syllabus

ITM 576
Data Center Management

Please print a copy of this syllabus for handy reference.

Whenever there is a question about what assignments are due, please remember this syllabus is considered the ruling document.

Professor:	William F. Slater III
Address:	Chicago, IL
Telephone:	312-758-0307 (Mobile) / 773-235-3080 (Home Office)
Fax:	*Optional*
Email:	**wslater@iit.edu**
	Personal e-mail: **slater@billslater.com**
Offices:	Not applicable, but I will be available for face to face meetings outside class at IIT per pre-arranged appointment.
Office Hours:	Location and times:

Mondays: 7:00 PM Central Time – 10:00 PM Central Time
Wednesdays: 7:00 PM Central Time – 10:00 PM Central Time
Thursdays: 7:00 PM Central Time – 10:00 PM Central Time
Saturdays: 9:30 AM Central Time – 12:30 PM Central Time
Sundays: 9:30 AM Central Time – 12:30 PM Central Time
Online: via Windows Live Communicator (username:
***datacentermanager@live.com*)**
SKYPE: username = billslater (by arrangement)
or by telephone to 312-758-0307 (Mobile) or 773-235-3080 (Home Office)

Course Catalog Description:

This course is an in depth examination of best practices in the management of enterprise data centers. Topics include data center consolidation; data center maintenance; server and network management methods and tools; budget and finance; service level agreements; managing data center personnel and staff; and disaster recovery. Prerequisite: ITM 535. (suggested, but not required)

Prerequisites: ITM 535 (suggested, but not required) **Credit:** 3 Semester Hours

Lecture Day, Time & Place: Tuesday 6:25 PM to 9:05 PM Central Time at IIT's Main Campus Stuart Building Room 204, or online via IIT Online.

Course Objectives: Each successful student will demonstrate foundation knowledge and application the following skills:

1. Applying fundamental principles of good Data Center design and layout.

2. Acquire the ability to understand how Data Center Economics and the application of Business Requirements can be used to optimally manage a Data Center, given the current state of available technologies and a finite amount of resources.

3. Acquire the ability to determine what can be done cost-effectively, and what cannot, as a Data Center grows, consolidates, evolves, and changes.

4. Experience with understanding how Data Center Projects are managed well, and develop an understanding of Data Center Projects and Data Center Lifecycles.

5. Experience with understanding how ever-increasing power and heat loads can be managed.

6. Being able to effectively understand and communicate with Vendors, Architects, Engineers, Facility Specialists and Contractors during the management and probable enhancements of a Data Center for upgrades or expansions.

7. Understand the importance of and best practices in Data Center Management, management reporting, compliance management frameworks, Data Center Security, Data Center Safety, and Data Center Audits.

8. Develop the ability to develop and maintain Business Continuity Plans and Disaster Recovery Plans related to Data Center Operations.

9. Understand the technology trends that will impact the future of the Data Center and Data Center Management.

Schedule of Topics/Readings: *Note - You should do all readings prior to class.*

Session	Date	Topic(s)	Reading Assignment(s)	Assignment(s)
1	August 23, 2011	Introduction, Course Overview, Computing & Data Center History, Data Center Design Lifecycle	Chapter 1, 2, 3, 4, Jayaswal	Download and review the slides for Lecture 01
2	August 30, 2011	Data Center Planning: Build Projects, Location, Facility Space Usage, Floorspace, Layout and Network Cabling	Chapter 5 and 8, Jayaswal	Download and review the slides for Lecture 02
3	September 6, 2011	Data Center Planning: Racks, Cabling, and Zone Distribution	Chapter 5, Jayaswal	Download and review the slides for Lecture 03
4	September 13, 2011	Service Management and Service Management Frameworks	Will provide materials.	Download and review the slides for Lecture 04
5	September 20, 2011	Data Center Management Tools and Data Center Tools and Reporting	Will provide materials.	Download and review the slides for Lecture 05
6	September 27, 2011	CapEx and OpEx Budgets and Data Center Economics - The Business Side of Data Centers; Vendor Management	Will provide materials.	Download and review the slides for Lecture 06 **Paper outline due.**
7	October 4, 2011	Data Center Project Management; Asset Management	Will provide materials.	Download and review the slides for Lecture 07
8	October 11, 2011	Data Center Power	Chapter 7, Jayaswal	Download and review the slides for Lecture 08
9	October 18, 2011	Data Center Cooling	Chapter 8, Jayaswal	Download and review the slides for Lecture 09
	October 25, 2011	*** Fall Break *** No Class		
10	November 1, 2011	Backup Power	Will provide materials.	Download and review the slides for Lecture 10 **Paper bibliography due.**
11	November 8, 2011	Data Center Security and Data Center Safety	Will provide materials.	Download and review the slides for Lecture 11
12	November 15, 2011	Data Centers and Compliance Frameworks	Will provide materials.	Download and review the slides for Lecture 12
13	November 22, 2011	Data Center Audits; Data Center Networking, Business Continuity and Disaster Recovery	Will provide materials; Chapter 5 and 38, Jayaswal	Download and review the slides for Lecture 13
14	November 29, 2011	The Life of a Data Center Professional;Future Technology Directions and Their Impacts on the Data Center	Will provide materials.	Download and review the slides for Lecture 14 **Research paper due.**
15	December 6, 2011	Data Center Modules or "Containers"; Tiny, Small, Medium, and Enormous Data Centers	Will provide materials.	Download and review the slides for Lecture 15 **Team Projects Due Final Exams Due**

Textbook: The textbook for this course is **mandatory**.

Text Title: Administering Data Centers: Servers, Storage, and Voice over IP
Author: Kailash Jayaswal
Date: 2006
Publisher: Wiley Publishing

(Note: PDF of the text will be made available if the student is OK with an electronic version of the text.

Readings: Readings for the class will be assigned from the textbook as well as in the form of handouts or online reading. It is essential that you do all readings before coming to class on the assigned date. The readings and taking notes are necessary and integral part of the class and will form the basis for any class discussions on the topic. Specific readings are assigned by topic above. Online resources will be linked from Blackboard or will be posted on Blackboard.

Course Outcomes:

◆ Possess a deep understanding about the operational role and responsibilities of a Data Center Manager in a modern Data Center.

◆ Will possess an understanding about how to design a modern Data Center, and how to participate on projects that involve Data Center repairs, enhancement or upgrades.

◆ Will possess the ability to understand and describe the business drivers and constraints that influence Data Center design and construction.

◆ Will be able to effectively understand and communicate with Architects, Engineers, Facilities and Contractors during the management and possible enhancement of a Data Center or a Data Center upgrade or expansion.

◆ Will be able to understand and describe the most critical issues and components that affect the design and operation of production Data Centers.

◆ Will have a solid understanding of Data Center Economics and the financial drivers that impact the design, construction and operation of modern Data centers, and be able to communicate these as part of a project delivery process.

◆ Will have a solid understanding of issues related to Data Center safety, security as well as some of the compliance frameworks that help document and ensure that organizations are in compliance.

◆ Will be able to identify and determine the importance and usefulness of new trends and technologies that will affect the design and operations of modern Data Centers.

Course Notes: Copies of the course lecture notes in the form of a PDF of the PowerPoint presentation accompanying each lecture will be provided for each student on Blackboard. This should be useful if you must miss a class. You should be aware that note taking is encouraged and should help your understanding of the material.

Course Web Site: http://blackboard.iit.edu/

Blackboard: The course will make intensive use of Blackboard (http://blackboard.iit.edu/) for communications, assignment submissions, group project coordination, providing online resources and administering examinations. All remote students will view course lectures online via Blackboard, and online readings will be found on Blackboard.

Guest Speakers: Guest speakers may be featured as part of course topics. When a guest speaker is expected you should make an extra effort to be seated and ready prior to class time. A question & answer/discussion period will be held at the end of each speaker's presentation.

Attendance: If you are in a live section of the class and will not be able to attend class, please notify me via email (slater@billslater.com) or by text message to 312-758-0307 prior to class time.

Assignments:

Assignment 1 – Graduate Students	Write an original research paper on a Data Center-related topic that you are interested in that you would like to learn more about. This paper will be fifteen to twenty pages long and will meet standards expected of a paper submitted for journal publication. Instructions for submission of the paper will be included with the assignment on Blackboard. You must fully attribute all material directly quoted and you must document all sources used in the preparation of the paper using complete, APA-style bibliographic entries. Failure to format your bibliography entries in APA style will result in an automatic reduction of one letter grade for this assignment. No more than thirty-three percent of material included in any paper may be direct quotes. No more than sixty percent of the resources cited may be from online, and Wikipedia.org will not be allowed as a reference. Submission of the paper for actual publication is optional but highly encouraged. A basic outline for your paper—which should be at least two pages in length—will be due September 27, 2011; a preliminary bibliography will be due November 1, 2011. The Research Paper will be due November 29, 2011. *Note:* I will provide specific guidelines and an example for research papers.
Assignment 1 – Undergraduate Students	Write an original research paper on a Data Center-related topic that you are interested in that you would like to learn more about. This paper will be 10 to fifteen pages in length. The three pages should be content and do not include cover page, bibliography, charts, diagrams, figures, appendices or other included materials. Topics should be of particular interest to you and may be more technical in nature than the course. Papers must have a complete bibliography citing a minimum of five sources other than the textbook or class notes. You must fully attribute all material directly quoted and you must document all sources used in the preparation of the paper using complete, APA-style bibliographic entries. Failure to format your bibliography entries in APA style will result in an automatic reduction of one letter grade for this assignment. No more than thirty-three percent of material included in any paper may be direct quotes. No more than sixty percent of the resources cited may be from online. A basic outline for your paper—which should be at least two pages in length—will be due September 27, 2011; a preliminary bibliography will be due November 1, 2011. The Research Paper will be due November 29, 2011. *Note:* I will provide specific guidelines and an example for research papers.
Assignment 2 – Graduate Students and Undergraduate Students	This a Team Assignment. Given business requirements, technical requirements, and a budget, this paper will provide a Data Center Operations Management Plan for a modern Data Center. You must include the Floorplan Layouts as a Visio, Autocad or Excel Diagram, whichever you are comfortable working with. (Preferably Visio). Basis for Development: Select computer hardware, either devices with which you are familiar, or devices for which you can realistically get the required data. Include hardware in your equipment makeup in at least the categories represented by the following. (This list is not an attempt to define all the devices a Data Center with this computational level would have. If you wish to add other devices, you may certainly do so as long as you define what they are.). You must fully attribute all material directly quoted and you must document all sources used in the preparation of the paper using complete, APA-style bibliographic entries. Failure to format your bibliography entries in APA style will result in an automatic reduction of one letter grade for this assignment. This paper will be due on December 6, 2011. Note: I will provide guidelines about the paper and the formation of the Teams, and I provide an actual example for this research paper. I will also provide guidance for research topics and contents.

Quizzes: I will give 5 pop-quizzes quizzes during the course and may use them for verification that you have completed assigned reading. As they are discretionary, the weight of quizzes in grading is also left to my discretion and will be included in your class participation grade. Quizzes may be online via Blackboard.

Examinations: The final examination will consist of a take-home essay section and an in-class multiple choice examination measuring course outcomes as discussed above. Internet students residing in the Chicago area should make arrangements to attend the final examination at the Main Campus in Chicago. Online students in the Chicago area who cannot attend the final exam during the scheduled final exam period due to a conflicting exam must make alternate testing arrangements with me. Internet students in remote locations will arrange for examination proctoring through IIT Online.

Plagiarism: All work you submit in this course **must be your own**. You must fully attribute **all** material directly quoted in papers and you must document all sources used in the preparation of the paper using complete, APA-style bibliographic entries. Including directly quoted material in an assignment without attribution is always plagiarism and will always be treated as such by me. No more than thirty-three percent of material included in any paper may be direct quotes. You are expected to do quality research and submit original work on all written assignments. **I will not tolerate it plagiarism**. If you submit plagiarized material you **WILL** receive a grade of **ZERO** for the assignment, an Academic Honesty Violation Report will be filed, and it may result in your expulsion from the course with a failing grade as per the IIT and ITM academic honesty policies. **There is no excuse for not understanding this policy** and if you do not understand it please let me know and I will be happy to discuss it with you until you do.

Grading: Grading criteria for ITM 4XX/IT 4XX students will be as follows:
- **A** *Outstanding work reflecting substantial effort*.. 90-100%
- **B** *Excellent work reflecting good effort*... 80-89.99%
- **C** *Satisfactory work meeting minimum expectations* 70-79.99%
- **D** *Substandard work not meeting expectations* 60-69.99%
- **E** *Unsatisfactory work*... 0-59.99%

Grading criteria for ITM 5XX students will be as follows:
- **A** *Outstanding work reflecting substantial effort*.. 90-100%
- **B** *Adequate work fully meeting that expected of a graduate student*........................... 80-89.99%
- **C** *Weak but marginally satisfactory work not fully meeting expectations*................... 65-79.99%
- **E** *Unsatisfactory work*... 0-64.99%

The final course grade will be calculated as follows:
Assignment 1...**30%**
Assignment 2...**30%**
Final Exam...**30%**
Quizzes/Class Participation **10%**

Disabilities: Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me as soon as possible. Our office hours are listed on the first page of the syllabus. The Center for Disability Resources is located in the Life Sciences Building on the Main Campus, room 218, 312-567-5744 or disabilities@iit.edu.

Our Contract: This syllabus is my contract with you as to what I will deliver and what I expect from you. If I change the syllabus, I will issue a revised version of the syllabus; the latest version will always be available on Blackboard.