Example of a Well-Designed Course in:

Computer Information Systems

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1. Specific Context

- **The subject matter: Computer Concepts**
- **The title of the course: Software and Hardware Concepts**
- **Typical class size: 25**
- **Level of the course: Freshman (2nd semester)**
- **Mode of delivery: Online**
- **Type of institution: Large Multi-Campus Urban Community College**

2. General Description of the Course

This course is a survey of technical topics related to computer systems with emphasis on the relationships between hardware architecture and systems software. It covers binary and hexadecimal arithmetic, data representation, and introduces machine code and symbolic language.

3. Big Purpose of the Course

My hope is that within 5 years after my students leave the institution, as a result of the foundational knowledge, skills, and abilities received in this course, they will have obtained employment in the field of Information Technology and/or will be pursuing a 4-year or post-graduate degree in technology as a result of.

4. Important Situational Factors/Special Pedagogical Challenge

- The <u>most important situational factors</u> of this course
  - Students who are enrolled in the course are diverse in age, socio-economic and ethnic backgrounds. Many have at least a part-time job, family responsibility, and little-no social support structure for attending school; thus, they are easily distracted.
  - Many of the students are first generation college students and do not understand the time and effort requirements of taking a course.

- The instructor has extensive experience in teaching online and using the advanced tools in the learning management system.
- The instructor has extensive experience with multiple learning styles and multiple delivery methods of instruction.

- <u>Responses</u> to the situational factors
  - I attempt to create engaging, while challenging, instructional activities that both draw the student into the course and build their confidence in learning.
  - I attempt to use learning activities which expose students to successful people in the field of technology and show how they started right where they before becoming successful.
  - I attempt to get to know enough about my students to be able to both mentor them through distractions while at the same time meeting their individualized learning needs.

- <u>Special Pedagogical Challenge</u>
  - The single greatest challenge for me as an instructor is to keep students engaged throughout the course.
  - The single greatest challenge for students is balancing life requirements with educational requirements.

- <u>How to address this Challenge</u> during the first week of classes
  I attempt to engage students with myself, each other, and the content in the first week of the class. I ask them to reflect of why they are there and what they want to accomplish. Once they discover that they have common goals, they tend to become a community of learners who become each other's support group.

5. 3-Column Table

Use this table below to provide information about these three aspects of your course design.

LEARNING GOALS:	ASSESSMENT ACTIVITIES:	LEARNING ACTIVITIES:
1. **Foundational Knowledge** • Describe the process of creating an executable program from a source program; • Describe the development of data organization from file systems to object-oriented databases; • Describe the development of systems software and operating systems; • Describe the CPU fetch/execute cycle and the use of instruction formats and registers in the execution of instructions;	Final Examination with Short Answer or Essay Questions	• Create a flowchart of the steps in the process of creating an executable program from a source program; • Compile a history of the development of data organization from file systems to object-oriented databases; • Compile a history of the development of systems software and operating systems; • For each instruction format, identify on a chart, the components of the CPU fetch/execute cycle, identify the path of data/instructions as they pass through the components of the CPU

2. **Application**	Lab Exercises with Word Problems or Case Projects	
• Perform arithmetic functions in multiple number systems, including binary, decimal, and hexadecimal; • Perform conversion operations between numbering systems, including binary, decimal, and hexadecimal; • Utilize decision logic tools to create truth tables and decision tables;		• For each number system, complete math worksheets with problems; • For each number system, complete math worksheets with problems; • Complete a case problem to create a truth table and a decision table (Refer to task noted in section 6A);
3. **Integration**	Case Projects and/or Final Examination with Short Answer or Essay Questions	
• Compare and contrast simple data types, including alpha-numeric characters, signed and unsigned integers, floating point numbers, and Boolean; • Compare and contrast various addressing modes used in instructions; • Compare and contrast various paging and segmentation and its relationship to memory caching; • Compare and contrast the types of memory - conventional, upper, expanded, extended, high and virtual memory; • Compare and contrast various derived data types, including		• Create a table of simple data types, their ranges and their memory sizes; • Create a table of addressing modes and their benefits/consequences; • Create a table of memory caching techniques and their relationship to either paging or segmentation; • Create a table of the types of memory, their addresses, and what parts of the system use them; • Create a table of derived data types, their ranges and their memory sizes; • To each of the tables created

pointers, arrays, tables, linear lists, linked lists, stacks, and queues; • Analyze the effects of using various data sizes on the ranges of values stored; • Analyze various data management tools, including hardware and software interrupts, multitasking and context switching; • Analyze the relationship between the various the components of a computer, including the CPU, busses, memory devices, storage devices, and communication devices; • Analyze the efficiency of various sorting and searching methods, including transverse trees, heaps, and graphs;		for simple/derived data types, add a column which the benefits/ consequences of using each data type; • Create a diagram of the interaction between hardware and software interrupts, multitasking and context switching; • Create a diagram of the interaction between the various the components of a computer; • Create a table of sorting and searching methods indicating in Big-O notation the efficiency of each method.
4. Human Dimension: Self: • Develop a statement of personal ethics regarding the use of digital information. Others: • Develop collaborative and	Journal Writing Group Projects	• Using a series of journal assignments with appropriate prompts, develop a statement of personal ethics regarding the use of digital information; • For as many of the assignments listed in this table, use group collaborative tools wikis and discussion forums;

cooperative community building skills for use in the future courses and in the workforce;		
5. **<u>Caring</u>** • Discover their niche in the in the information technology field; that is, what are they will pursue as a specialty.	Journal Writing	• Using a series of journal assignments with appropriate prompts, develop a short-term/long-term plan for professional development;
6. **<u>How to Keep on Learning</u>** • Develop a plan for lifetime learning which will facilitate the professional growth of the student beyond graduation;	Journal Writing	• Using a series of journal assignments with appropriate prompts, develop a short-term/long-term plan for professional development;

- Add 1-2 paragraphs of comments about the goals or your effort to identify good goals and appropriate learning and assessment activities.

I believe the most significant thing I learned from this exercise is the transferability of this process to multiple disciplines. While previously I looked at 'hands-on activities' to be identified as working 'with' the technology, I now see that 'hands-on' also means 'brain-on' for critical thinking. I also learned that if you know 'how' you are going to assess learning, you can 'create learning experiences' that guarantees the student will learn at the level you expect.

6. Weekly Schedule

Here is an example of a table to do this. But modify this table to fit the time structure of your course.

Week:	Self-Study (Student- Content)	Interactive Study (Student-Student)	Feedback/Reflection (Student-Instructor)
1.	Read Syllabus/Investigate Course in Blackboard/Begin Unit Assignments with Topic 1 – Introduction (Each Topic has a minimum of these activities – • Read Chapter Materials • View/Listen to a recorded lecture • Take an Assessment)	Bio Forum (Discussion) – Introduce yourself and meet others in your class – Why are you here and what do you expect to gain from taking this course?	Journal Question: What is your study strategy going to be?
2.	Topics 2 & 3 • Overview of the Personal Computer and IPOS • Data Representation, ASCII, and Unicode Create a diagram of the interaction between the various the components of a computer;	Bio Forum (Discussion continues)	JQ: What was your first experience with a computer? Was it easy to use? How did you learn to use it?
3.	Topics 4 & 5 • The Binary Number System and Communications • The Hexadecimal Numbers System and Addressing	Group Cooperative Assignment – Complete a set of labs using a wiki	Feedback to group and to individuals about their lab assignment; Muddiest Point Assessment
4.	Topics 6 & 7 • Real Numbers and Floating Point Operations • Integers and Complements	Group Cooperative Assignment – Complete a set of labs using a wiki	Feedback to group and to individuals about their lab assignment; Muddiest Point Assessment; Student completes a Unit Exam.
5.	Begin Unit Two Assignments	Discussion Forum - What were the most	JQ: What led you to choose the

	Topics 8 & 9 • The POST and System Resources • The System Busses Create a table of the types of memory, their addresses, and what parts of the system use them;	important technological advancements prior to the 20th Century? What impact or non-impact did these advancements have on national and world events?	technology you posted about? After reading other postings, has your mind changed? Why or why not?
6.	Topics 10 & 11 • The CPU and Memory • Processes, Threads, and the Kernel For each instruction format, identify on a chart, the components of the CPU fetch/execute cycle, identify the path of data/instructions as they pass through the components of the CPU	Group Cooperative Assignment – Compile a history of CPUs and Busses? Indicate how they were developed, by whom, and what impact they have had on the market, nationally and internationally. Don't forget to look forward to see what is in research and development.	Feedback to group and to individuals about their postings; Muddiest Point Assessment
7.	Topics 12 & 13 • Synchronous and Concurrent Processes • Deadlocks and Processing Scheduling	Discussion Forum - What were the most important technological advancements during the 20th Century? What impact or non-impact did these advancements have on national and world events?	JQ: What led you to choose the technology you posted about? After reading other postings, has your mind changed? Why or why not?
8.	Topic 14 • Performance and Multi-Processor Management Create a diagram of the interaction between hardware and software interrupts, multitasking and context switching	Discussion Forum - What are the most important technological advancements expected in the next century? What persons, companies, nations, or other group will create these advancements? Who will benefit? Who will lose market share as a result? Example: When cars were invented, many industries were built to support it (gas stations, road construction, etc.); but many industries diminished (saddle makers, horseshoe makers, etc.).	JQ: What led you to choose the technology you posted about? After reading other postings, has your mind changed? Why or why not?
9.	Begin Unit Three Assignments Topic 15	Discussion Forum - Choose a technology company that rose to forefront in the 1980's	JQ:Who do you think is or will be the most successful company over the next

		(other than Microsoft and Apple). What gave them the opportunity for success and what were the market players that drove the success of the company? How has that company changed since the 1980's? What impact did this company have on other companies, nations, or economic centers?	10 years (Microsoft or Apple)? Why do you believe this?
	• Real and Virtual Memory Management Create a table of addressing modes and their benefits/consequences; Create a table of memory caching techniques and their relationship to either paging or segmentation;		
10.	Topics 16 & 17 • Secondary Storage • Overview of the Operating System	Group Cooperative Assignment – Compile a history of computer storage technologies, including memory modules, punch cards, magnetic tape, and magnetic discs, optical discs, etc. Indicate how they were developed, by whom, and what impact they have had on the market, nationally and internationally. Don't forget to look forward to see what is in research and development.	Feedback to group and to individuals about their postings; Muddiest Point Assessment
11.	Topics 18 & 19 • Overview of Applications and Programming • Flowcharts, Pseudo-code and Algorithms Create a flowchart of the steps in the process of creating an executable program from a source program;	Group Cooperative Assignment – Compile a history of systems software and operating systems Indicate how they were developed, by whom, and what impact they have had on the market. Don't forget to look forward to see what is in research and development.	Feedback to group and to individuals about their postings; Complete Muddiest Point Assessment
12.	Topics 20 & 21 • Structured, Object-Oriented, and Aspect-Oriented programming • Files and Databases	Group Cooperative Assignment – Compile a history of the development of data organization from file systems to object-oriented databases. Indicate how they were developed, by whom, and what impact they have had on the market. Don't forget to look forward to see what is in research and development.	Feedback to group and to individuals about their postings; Muddiest Point Assessment

13.	Begin Unit Four Assignments Topic 22 • Decision Logic	Group Cooperative Assignment – Complete a programming assignment (mentioned earlier) using a wiki	Feedback to group and to individuals about their postings; Muddiest Point Assessment

14.	Topics 23 & 24
	   • Pointers, Arrays and Tables
	   • Other Data Structures
	Create a table of simple data types, their ranges and their memory sizes;
	
	Create a table of derived data types, their ranges and their memory sizes;
	
	To each of the tables created for simple/derived data types, add a column which the benefits/ consequences of using each data type
		Discussion Forum – What is your favorite computer application? Why? How has that application changed its industry (office, finance, entertainment, etc)?	JQ: In your own words – Explain how a shopping list is an array? What type of array is it?

15.	Topics 25 & 26 Graphs and Search Algorithms Sort Algorithms Create a table of sorting and searching methods indicating in Big-O notation the efficiency of each method.	Group Cooperative Assignment – Compile a history of Search and Sort Algorithms? Indicate how they were developed, by whom, and what impact they have had on the market. Don't forget to look forward to see what is in research and development.	Feedback to group and to individuals about their postings; Muddiest Point Assessment
16.	Review for Final Exam	Discussion Forum: Name the most interesting thing you learned in this class	Complete a Final Examination; Complete an end-of-course survey; JQ: develop a short-term/long-term plan for professional development; JQ: develop a statement of personal ethics regarding the use of digital information

- Include, if possible, a brief description of your <u>teaching strategy</u>

  It's all about life-long learning. If I can set a foundation for learning based upon a love of my subject, I believe my students will seek knowledge on their own. Technology is an ever-changing field. What technology looks like now is very different than what it will look like tomorrow. Students need to learn how to keep up with these changes. That is my goal as a teacher. If they love the subject and they know how to learn, they will love learning throughout their lifetime. I seek this goal through relationship and relevance of the subject to their life, and setting up the course in a way that creates readiness of the student to learn.

- Add 1-2 paragraphs of comments about <u>anything special you needed to do</u>, to make this course work right.

  There are several aspects of this course that require mentioning. First, proper setup of this course in the first 2 weeks is critical to engagement. Students must be drawn in via the Discussion Board and Announcements. Additionally, the course requires regular communication from the instructor – weekly at minimum and more frequently when special circumstances dictate. Second, this course is heavy in its use of collaboration and reflection. The instructor must be as engaged in the course as the students. The instructor is a participant, too. Finally, success assessment is dependent students completing all of the activities and then developing the learning portfolio over the course of the semester. Students will build upon their understanding as the course progresses. If students who are week at the beginning of the course eventually develop the skills by the end of the course, their grade should reflect the final learning that is mastered.

  Here are some things I do to make life simpler for me and my students.
  1. I create all of my weekly communications in advance and set them in the LMS to be available and not available appropriately.
  2. I grade weekly on Monday the items that were due the Friday before. I give individual feedback as needed and group feedback as appropriate.
  3. I login to the DB 3-4 times per week and respond to posts of students. I respond to the content of posts in the DB and respond to grading issues in an email.
  4. I start the course with a welcome announcement and end the course with a 'so long' email encouraging them to engage in the topic even further as they progress through their degree program.

7. **Evidence of Impact** (optional)

This course was re-designed in the spring of 2012 and will be taught later this year. So this is "to be determined."

8. **Most Exciting Aspect of the Re-Designed Course for Me** (optional)

[Same as above.]

9. **My Contact Information**

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