CS 364 - Software Engineering 1

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CS 364 - Software Engineering 1
Schedule

Disclaimer
The instructor reserves the right to make changes to the schedule, as well as to homework assignments. You will be notified in class when changes are made.

Homework

Date	Start	Due	Topic (Reading)
1/6	00, 01		Course introduction and overview Summaries Decision(s) regarding class project(s)
1/7			Requirements engineering overview
1/8		01a	continued
1/11	03		"Software Requirements" by Cleland-Huang - volume 1 page 113 *organize requirements elicitation presentation groups*
1/12		01b	continued
1/13			"Software Requirements" by Sawyer - volume 1 page 125
1/14			Good requirements
1/15		03	*Presentation work day*
1/18			*Civil Rights Day - no class*
1/19			Requirements elicitation presentations - collaborative sessions: overview, brainstorming, Delphi technique
1/20			Requirements elicitation presentations - interviewing - questionnaires
1/21			Requirements elicitation presentations - ethnography - surrogate techniques (e.g., role playing) and documentation
1/22	02a		Requirements elicitation presentations - scenarios - modeling and prototyping
1/25	04	02a	Software Requirements Specification (SRS, IEEE Std 830) and specification techniques *organize to work on SRS*
1/26			Requirements conclusion
1/27			Requirements and design: "The Deep Dive"
1/28			Introduction to software architecture
1/29			Introduction to design
2/1			Introduction to design: coupling and cohesion
2/2			Introduction to design: object-oriented analysis and design
2/3		01c	*SRS work day*

2/4		01d	"Architectural Styles, Design Patterns, and Objects" by Monroe, Kompanek, Melton, and Garlan- volume 1 page 249
2/5	05		"Software Design: An Introduction" by Budgen - volume 1 page 209 *organize design representations presentation groups*
2/8			*SRS work day* **SRS v0 due** - ***specify portions to be reviewed (in priority order), including at least one subsection of section 3.2***
2/9			*SRS work day*
2/10			SRS v0 walkthrough
2/11			*BYU STEM career fair - no class*
2/12		01e	*Presentation work day*
2/15			*President's Day - no class*
2/16	02b	05	"Software Design: An Overview" by Tremblay and Pons- volume 1 page 195
2/17			Design representations presentations - flow chart - data flow diagram
2/18			Design representations presentations - entity-relationship diagram - state transition diagram
2/19			Design representations presentations - Jackson structure diagram - structure chart
2/22			Design representations presentations - UML (Unified Modeling Language)
2/23		04	*SRS work day* - **SRS v1 due**
2/24			SRS confessional and peer evaluation
2/25	06	02b	Software Design Description (SDD, IEEE Std 1016)
2/26			Design conclusion
2/29			*SDD work day*
3/1			After BYU-Idaho: job search
3/2			After BYU-Idaho: job offers
3/3			After BYU-Idaho: graduate school, decision making
3/4			What is software engineering?
3/7			continued
3/8		01f	*SDD work day*
3/9		01g	"Software Engineering" by Pressman, sections 1-4 - volume 1 page 3
3/10			"Software Engineering" by Pressman, sections 5-11 - volume 1 page 15
3/11			*SDD work day* **SDD v0 due** - ***specify portions to be reviewed (in priority order), including at least one design entity***

3/14		*SDD work day*
3/15	01h	SDD v0 walkthrough
3/16	02c, 07	"Software's Chronic Crisis" by Gibbs - volume 1 page 63 *organize software crisis presentation groups*
3/17		*SDD work day*
3/18		*SDD work day*

3/21	07	*Presentation work day*
3/22		Software crisis presentations - Therac-25 - London Ambulance Service - HealthCare.gov (2013) - FBI Virtual Case File
3/23		Software crisis presentations and discussion - Denver Airport - Ariane 5 - Flight 501 - NASA
3/24		*SDD work day*
3/25	01i	*SDD work day*

3/28		"Professional Software Engineering: Fact or Fiction" by McConnell and Tripp - volume 1 page 73 "Are Developers Morally Challenged?" by Dakin - volume 1 p 107 Professionalism Credentialing
3/29	02c	*SDD work day*
3/30		Software engineering conclusion
3/31		*SDD work day*
4/1		*SDD work day*

4/4		*SDD work day*
4/5	06	*SDD work day* - **SDD v1 due**
4/6	00	SDD confessional and peer evaluation

CS 364 - Software Engineering 1
Homework

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00 | 01 | 02 | 03 | 04 | 05 | 06 | 07
9088 points possible
General Homework Instructions

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00 Scriptures
128 points

Each class shall start with at least one brief presentation of a scripture. You are required to present at least one scripture from the Standard Works during the semester. Each scripture (one or more verses) shall pertain to the topics of this course: software engineering, requirements, or design. Just as Nephi, you are encouraged to "liken all scriptures unto us" (1 Nephi 19:23).

Each scripture shall be one that has not been presented before in this class. Duplicate scriptures are not accepted. Scripture mastery scriptures are not accepted either.

Please note that the start of class is not delayed to wait for you or your scripture. If you are late to class or unprepared on your assigned day, you will not deliver a scripture on that day.

Information to help you successfully complete this homework assignment is available at http://157.201.194.254/cgi-bin/twitchellk/scriptures/studentTracker.pl?class=cs364 *(on campus only)*.

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01 Summaries
128 points each

Prepare and submit a summary of each of the following articles:

a. "Software Requirements" by Cleland-Huang - volume 1 page 113
b. "Software Requirements" by Sawyer - volume 1 page 125
c. "Architectural Styles, Design Patterns, and Objects" by Monroe, Kompanek, Melton, and Garlan - volume 1 page 249
d. "Software Design: An Introduction" by Budgen - volume 1 page 209
e. "Software Design: An Overview" by Tremblay and Pons - volume 1 page 195
f. "Software Engineering" by Pressman, sections 1-4 - volume 1 page 3
g. "Software Engineering" by Pressman, sections 5-11 - volume 1 page 15
h. "Software's Chronic Crisis" by Gibbs - volume 1 page 63
i. "Professional Software Engineering: Fact or Fiction" by McConnell and Tripp - volume 1 page 73 **and** "Are Developers Morally Challenged?" by Dakin - volume 1 p 107 (half-length total covering both papers)

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02 Opinion Papers
128 points each

Given the instructions below, write a 512-1024 word opinion paper. Do not objectively evaluate all relevant issues. Clearly state your opinion and support that opinion. This may include rejecting alternatives to support your opinion. While each paper is primarily your opinion, give proper credit for intellectual property.

For your sake, clearly delineate each part of your response. Clearly label each part. Use headings as well as separate paragraphs.

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a

For each of the four situations below, list and briefly explain two unique and appropriate techniques (presented in class) to elicit functional requirements from stakeholders who

1. know what they have but don't know what they want

2. know what they want but are unable to articulate it
3. cannot agree on what they want
4. fail to share background knowledge with you because "everybody knows it"

In addition to briefly explaining each selected requirements elicitation technique, clearly state and briefly discuss why that technique is appropriate for the associated situation.

Base your answers on the inherent properties of the elicitation techniques (and not general to most or several techniques). For example, explaining that a technique is "effective in providing a structured way for the stakeholder to express requirements" is not acceptable since this is true of all elicitation techniques. Base your response on properties that distinguish your selected technique from other techniques.

You shall not use any elicitation technique more than once.

Please note that you will specify a total of eight elicitation techniques, two for each of the four situations. Clearly associate the elicitation technique with a stakeholder situation (listed above). Each elicitation technique will have a brief explanation of the technique and a brief discussion of why it is appropriate for the associated situation. Thus there will be sixteen parts to your opinion paper.

For your sake, clearly delineate the various sections of your response.

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b "No matter how good a designer you are, you will not get the design right the first time."
Briefly respond to the following:

1. What is the primary reason why you won't get it right the first time? Clearly state the reason and discuss the reason.
2. Is this (not getting the design right the first time) a bad thing? Clearly state "yes" or "no"; don't be subtle. Why or why not?
3. What is the primary thing you can do to reduce the time and effort necessary to get it right? Clearly state the primary thing you can do and discuss it.
4. What is the best way to know you have it right? Clearly state the best way to know you have it right and discuss it.

Please note that your response should demonstrate your mastery of assigned material.

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c Can software engineering reduce the software crisis to insignificance?
Submit the following:

1. a brief explanation of software engineering
2. a brief explanation of the software crisis
3. "yes" or "no" (don't be subtle)
4. justification of your response (as stated in part 3)

Be specific and direct; leave nothing to the imagination.
Part 4 should relate to parts 1 and 2 and be consistent with part 3.

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03 Requirements Elicitation Techniques

512 points

Work as organized. Teach your classmates how to use the requirements elicitation technique by making a 24-25 minute professional quality presentation. The 24-25 minutes includes presenting your material and answering questions.

For each assigned technique

- Explain it. Include examples.
- Discuss advantages.
- Discuss when its use is appropriate.
- Discuss disadvantages.

- Discuss when its use is inappropriate.
- Discuss its effectiveness in extracting requirements.
- Demonstrate how it applies to the class project by working at least one example.

Submit your visual material (such as presentation slides).

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04 Software Requirements Specification

2048 points

All class members shall work together to create a software requirements specification (SRS) for the class project conforming to IEEE Standard 830. A version 0 document that does not conform to the IEEE standard shall not be reviewed.

Include one or more appendices that demonstrate what you did to elicit requirements. This includes details regarding how the requirements were elicited and a summary of the results of the elicitation.

Number the pages. Prepare the document to be printed in black and white (i.e., no color).

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05 Design Representations

512 points

Work as organized. Teach your classmates how to use the design representation by making a 24-25 minute professional quality presentation. The 24-25 minutes includes presenting your material and answering questions.

For your assigned representation(s)

- Explain it (include history, symbols). Include examples.
- Discuss advantages.
- Discuss when its use is appropriate.
- Discuss disadvantages.
- Discuss when its use is inappropriate.
- Discuss its effectiveness in representing a design.
- Demonstrate how it applies to the class project by working at least one example.

Submit your visual material (such as presentation slides).

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06 Software Design Description

4096 points

All class members shall work together to create a software design description (SDD) for the class project using IEEE Std 1016 (as explained below). A version 0 document that does not conform to the IEEE standard (as explained below) shall not be reviewed. Your design shall be based on your requirements specification from homework 04.

Section 5 of the standard included in the text book is mandatory. Clearly identify your design entities and provide all ten attribute descriptions for each design entity. Provide a requirements-traceability matrix matching design entities and functional requirements; do not duplicate this information elsewhere in the document. Be sure to specify your choice of language(s) and operating system(s). Clearly state where execution starts.

Provide sufficient detail such that you could transmit your design to a programmer (in India or China) and receive the product you intended. While you should provide a detailed statement of functionality for each module, you shall not provide pseudocode.

You are permitted to include an appendix modifying requirements. All requirements modifications must be approved by the instructor. Clearly state which requirements you are deleting. Clearly state the requirements you are adding or modifying; follow the format used in your software requirements specification. Provide a justification for each change.

Provide overview material, including an overall description of the system. Provide a section for definitions, acronyms, and abbreviations. Define the types used to describe entities.

Number the pages. Prepare the document to be printed in black and white (i.e., no color).

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07 Software Crises

256 points

Work as organized.

As appropriate, present the following information about your topic in a 10-11 minute presentation:

- what the system was, including a brief history
- how it failed
- why it failed, including root causes
- significance of the failure
- lessons learned

The 10-11 minutes includes presenting your material and answering questions.

Submit your visual material (such as presentation slides).

General Homework Instructions

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mediocre ideas + brilliant spelling, grammar, formatting, etc. != brilliance
brilliant ideas + mediocre spelling, grammar, formatting, etc. != brilliance, either

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Formatting

- Include your name in every assignment.
- Use an appropriate format for the assignment. Acceptable formats for homework assignments are
  - OpenOffice (.odt, .ods, and .odp),
  - Microsoft Office (.doc, .docx, .xls, .xlsx, .ppt, and .pptx), and
  - rich text format (.rtf).

  A spreadsheet is *not* a word processor.
  Pdf is not an acceptable format (except as noted in homework assignment descriptions).
- Use a black 12-point proportional-spaced serif font (e.g., Garamond or Palatino Linotype).
- Conserve electrons! Save trees! *(unless instructed otherwise)*
  - No title or cover page.
  - No table of contents.
  - No index.
  - Do not start a new section on a new page.
- The required length is exclusive of
  - headings,
  - figures,
  - graphics,
  - tables,
  - charts,
  - endnotes,
  - works cited,
  - bibliography, and
  - anything like unto the above.

Submitting - How and When

- All homework assignments shall be submitted electronically through the Linux lab. Use *submit* to submit your homework (unless instructed otherwise); do not use e-mail. Example:
  - submit whateverYouNamedIt.xyz

  where whateverYouNamedIt is your file and xyz is the appropriate extension.
- It is your responsibility to submit homework correctly, including, but not limited to, the correct content, the correct location, the correct format, and the correct file extension. I am not responsible for homework I do not receive.
- Assignments are due before midnight on the date specified in the schedule. However, I will accept your work as on-time if I have received it *before* 7:32 AM the next school day. (Note this is the next school day and not the next class day.) One second after that and the work is "everlastingly too late" (Helaman 13:38). Late homework shall not be accepted (unless accompanied with an Oops! card).

Grading

- Make sure your submitted homework satisfies all specified requirements.
- Some homework assignments are group assignments. The grades for these assignments are based on the product from the group, *not* on individual contributions *(see 1 Corinthians 12:26)*. If more than one copy of an assignment is submitted, I will grade the last one submitted. I reserve the right to adjust grades for group

members who do not contribute their fair share to the overall product. Take the opportunity to learn how to play well with others. The goal is to learn how to work with others toward a common objective.
- Submitted homework shall be of a professional quality. This includes correct spelling and grammar with clarity abounding. Assignments are also graded on length, formatting, completeness, and content.
- Microsoft Word's spelling and grammar checker provides little value. My grader uses WordPerfect to check spelling and grammar. Carefully proofread your work!

Watch Out!

- Eschew obfuscation!
- Don't use a big word where a diminutive one will suffice.
- Do not confuse technical writing and creative writing.
  - Technical writing is succinct.
  - Technical writing is unambiguous. Avoid synonyms. Leave no room for interpretation.
  - Use headings or keywords from the assignment to clearly indicate you are providing the required information.
  - Keep it plain.
  - Keep it simple.
  - Make it obvious.
- Use gender-neutral (non-sexist) language.
  - Stereotypes and Biased Language
  - Appropriate Pronoun Usage
- Know the difference!
  - stake holder and stakeholder
  - accept and except
  - affect and effect
  - as rather than as being
  - based on rather than based off of
  - causal and casual
  - customer and costumer
  - ensure and insure
  - internet and Internet
  - it's and its
  - manner and manor
  - morale and moral
  - principal and principle
  - role and roll
  - than and then
  - that and which
  - their and there
  - toward not towards
  - versus and verses
- Use complete sentences, everywhere.
- Do not use a plural pronoun with a singular antecendent.
- A serial (Oxford) comma is required (e.g., CS 308, CS 364, CS 432, and CS 499).
- With the exception of source code, a space shall precede the opening parenthesis (().
- Represent numbers appropriately! Know when to spell them out and when to use digits.
- Possessives require apostrophes; know where to put them.
- Use software product when you mean software product and software project when you mean software project.
- Life cycle is two words.

Common Errors in English

Summaries

The summary is evidence that the *entire* article was studied.

Generally, the length of the summary shall be 512-1024 words, excluding material specified in the General Homework Instructions. Some summaries will be specified "half-length" meaning 256-512 words.

Each summary shall not require more than one sheet of paper to print (printing will be done on both sides of a sheet of paper).

The summary shall have three clearly delineated sections. *Use headings.*

1. "important" points of the article
    - avoid plagiarism: document references to the article using page numbers in square brackets
    - while verbatim quotations are acceptable, they require quotation marks
2. a brief discussion of the things that you don't agree with
    - provide a verbatim quotation to clearly state what you disagree with; *this is not optional!*
    - be sure to explain how and why you disagree; be specific, provide details; examples are helpful; one or two sentences are probably inadequate
    - your disagreements must be correct, valid, and significant
        - correct - Your disagreement must be correct. For example, the author states that requirements are necessary. You disagree and state that requirements are not necessary. You are incorrect; requirements are always necessary, although the degree of formality may vary. Another example: the author states that design is optional for large projects. You disagree and state that while informal design may work for small projects, a large project requires formal design. You are correct.
        - valid - You must disagree with something the author actually wrote. Some students will reason, "The author wrote A. A implies B. B implies C. I disagree with C." If the author didn't state C, you cannot disagree with it. A verbatim quotation from the article is required for *each* disagreement. You must disagree with what is in the quotation.
        - significant - While you may disagree with how the author spelled a word, that is not significant. Disagreeing with absolutes and superlatives is also not significant. Disagreeing with numbers, such as percentages, simply because you do not think they are accurate, is not significant. Disagreeing because of a perceived lack of evidence from the author(s) is not significant.
    - this is not optional - you must have at least one disagreement in this section
    - do not ask the instructor to preapprove your disagreements
    - avoid plagiarism: document references to the article using page numbers in square brackets
3. a list of things in the article that you didn't understand, including unfamiliar terms and other items you would like clarified
    - do not omit this section: if you understood everything, clearly state that (in a full and complete sentence)
    - avoid plagiarism: document references to the article using page numbers in square brackets

Omitting page numbers is considered plagiarism and will be graded accordingly.

Square brackets document page number(s); they are not array indexes. A space shall precede the opening square bracket ([).

A works cited section is not required.

Plagiarism

While I encourage you to work with your classmates, *all submitted work must be original*. Share ideas, but **DO NOT SHARE CODE/TEXT (or anything like unto it)!**

To plagiarize is

- "to steal and pass off as one's own (the ideas or words of another) : use (a created production) without crediting the source
- to commit literary theft : present as new and original an idea or product derived from an existing source"

"plagiarize." Webster's Third New International Dictionary, Unabridged. Merriam-Webster, 2002. http://unabridged.merriam-webster.com (21 Dec. 2011).

Review BYU-Idaho's policy at http://www.byui.edu/student-honor-office/ces-honor-code/academic-honesty. Additional information is available at http://plagiarism.org/

There is no acceptable excuse for plagiarism.

Plagiarism may be intentional or unintentional. Regardless, the penalties are the same. Penalties for plagiarisim:

- one-eighth of the total possible points will be deducted for each occurrence of material that is obviously from another source but not properly cited
  examples: verbatim quotations enclosed in quotation marks, graphics
- a score of zero will be given (for the entire assignment) for other forms of plagiarism; grading stops with the discovery of plagiarism
  example: verbatim text without quotation marks (with or without a citation)

CS 364 - Software Engineering 1
Syllabus

Software engineering overview. Software requirements engineering including elicitation and specification. Software design.

After completing this course, the student should be able to

1. Demonstrate application of engineering principles to software development
2. Demonstrate ability to "play well" with others
3. Select an appropriate approach to eliciting, documenting, and reviewing requirements
4. Select an appropriate approach for documenting and reviewing a design

Prerequisite

- CS 308 (Technical Communication)

Required Text

- Software Engineering, Volume 1: The Development Process, Third Edition, Richard H. Thayer and Mark J. Christensen, editors (ISBN 0-471-68417-1)

Grading

- 90% Homework assignments
- 10% Attendance

Disabilities
Gender-based Discrimination and Sexual Harassment
Brother Twitchell Attendance Policies
BYU-Idaho Academic Policies: Attendance and Absence from Class, Electronic Devices in the Classroom

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Policies

Learning

- *"We are prepared for some things, and we receive just as fast as we prepare ourselves."* --Brigham Young
- **Learn how to learn!** Learn to develop alternative solutions and implement the most appropriate one. Computer Science means life-long learning. Learn to enjoy it now.
- Please control compulsions to answer every question posed in class. Allow your classmates to participate in class discussions. Elder Neal A. Maxwell taught, "On occasion, the biting of the tongue can be as important as the gift of tongues."

Grading

- My grading philosophy: If you cause me extra work, you pay for it.
- Do not ask me to pre-grade your assignment. I will answer specific questions about your work before you submit it. However, I have enough difficulty grading your work once and I certainly am not going to do it twice.
- Your grade is based on your product, not the amount of time you expended developing the product.
- My approach to grading is based on the competent programmer hypothesis, which is that competent programmers write programs that are close to being correct. When I grade, I concentrate on finding the little errors. The big errors are easy to find, for both you and me.
- The final grade for homework assignments is the ratio of total earned points and total possible points.
- The following grading scale is used:
  A - nineties and one hundred
  B - eighties
  C - seventies
  D - sixties
  F - 59 and below
  If the final digit is 7-9, a "+" (e.g., 88 is a B+).
  If the final digit is 0-2, a "-" (e.g., 61 is a D-).
  There is no A+, F+, or F-. The letter grade is obtained using rounding (e.g., 89.6 is an A-).
- Homework assignments are to be completed as scheduled. Late work is generally not accepted. However, assignments may be rescheduled for a *limited* number of *emergency* situations ***if*** *you discuss your situation with me* ***before*** *(not on and especially not after) the scheduled due date.* There will be no routine extensions of due dates - be prepared to justify any requests for extensions.

Miscellaneous

- Please don't embarrass me by putting me into a position where I will embarrass you with regard to the Honor Code (including dress and grooming standards).
- For me, assisting students has first priority. Grading has a lower priority than assisting students. I apologize for when I do not grade and return your work quickly.
- If you feel a need to stand during class, you may do so. If it will help you stay awake, please do so.
- Employment and internship information is available on the bulletin board by the Linux computer lab (213 AUS).
- My office hours start when I arrive and terminate when I leave. If my office door is open, and it usually is, please come in.
- I am willing to write a letter of recommendation for you if you have taken at least three credits of coursework from me in the current or previous semester.
- Henry David Thoreau wrote, "As if you could kill time without injuring eternity." When you feel an urge to kill time, please control the extent of the damage. You don't have a right to injure anyone's eternity but your own.

Professional Quality Presentation

A professional quality presentation

- is the correct length: not too short and not too long
- includes visual material (such as PowerPoint or handouts)
- is clear and understandable (includes examples)
- has easy-to-follow organization
- contains meaningful and enlightening content
- is interesting

Disabilities

Brigham Young University-Idaho is committed to providing a working and learning atmosphere that reasonably accommodates qualified persons with disabilities. If you have a disability and require reasonable accommodations, please contact the Disability Services Office at (208) 496-9210. Reasonable academic accommodations are reviewed for all students who have qualified documented disabilities. Services are coordinated with the students and instructor by the Disability Services Office.

More information is available at http://www.byui.edu/disabilities/disability-services.

Gender-based Discrimination and Sexual Harassment

Sexual harassment refers to unwelcome conduct of a sexual nature. Sexual harassment may include 1) unwelcome sexual advances, 2) requests for sexual favors, and 3) other verbal, non-verbal, or physical conduct of a sexual nature. Sexual harassment may also include denying or limiting, on the basis of sex, the student's ability to participate in or receive benefits, services, or opportunities in university programs. BYU-Idaho's policy against sexual harassment extends not only to employment situations but to academic situations as well. If a student feels he or she has encountered sexual harassment or gender-based discrimination, or if the student needs assistance or information related to allegations of sexual harassment, he or she should contact the Student Honor Office at 208-496-9300 or sho@byui.edu. Feel free to visit their web site at http://www.byui.edu/studenthonor.

Brother Twitchell's Attendance Policy

I reserve the right to require the completion of unannounced assignments during class time.

I do not have set lectures and I do not keep lecture notes. If you miss a lecture, obtain lecture notes from a classmate.

Class attendance is required and is part of the grade. The attendance portion of your grade is the ratio of the number of days you attend class and the number of days of class. The following adjust the attendance portion of your grade:

- Late is defined as arriving after the prayer is offered or leaving before class is scheduled to finish. A 50% penalty is applied for being late.
- Very late is defined as missing at least one-half the class. A 75% penalty is applied for being very late.

Additional penalties for habitual and chronic offenders (see Matthew 13:12):

- If you are late/very late/absent for one-eighth of the classes, the penalty is doubled for all occurrences.
- If you are late/very late/absent for one-fourth of the classes, the penalty is quadrupled for all occurrences.
- If you attend only one-half or fewer of the classes, you have failed the class (regardless of other grades).
