CINF 5234 – Advanced Systems Analysis and Design
Thu 4:00PM – 6:50PM
Delta 204

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Applied Critical Thinking Statement

This course has been authorized by UHCL as an Applied Critical Thinking (ACT) Course which means that in addition to learning about the specified course content, students will be engaged with some or all of the Elements of Thought and Universal Intellectual Standards of critical thinking. The objective of an ACT course is to develop the student's ability to become skilled at analysis and evaluation by applying a set of intellectual tools that may be effectively used across all disciplines (as well as to the student's personal life). Based on the Foundation for Critical Thinking model (http://www.criticalthinking.org/), critical thinking involves thinking for a *purpose*, asking *questions*, using *information*, applying *concepts*, drawing *inferences and conclusions*, identifying *assumptions*, anticipating *implications and consequences*, and recognizing *points of view*. The Universal Intellectual Standards that are applied to these Elements of Thought of critical thinking in order to develop Intellectual Traits include *clarity*, *accuracy*, *precision*, *relevance*, *depth*, *breadth*, *logic*, *significance*, and *fairness*.

Course Description

This course is focused on the analysis and logical design of computer-based information systems. The course is designed to be especially useful to those who wish to become object-oriented systems developers. Emphasis is placed upon the development of requirements specifications that serve the business needs of the organization and provide the necessary base for subsequent systems development. Information systems development is a process in which technical, organizational, and human aspects of a system are analyzed and changed in the hope of creating an improved system. In spite of the advanced technology that surrounds computer-based information systems, the process of systems analysis and design is still largely an art. There is a high dependence on the skills of individual analysts and designers even though there are principles, methods, techniques and tools to guide and assist in the processes involved. An effective systems analyst will have to ask "What information is relevant to this systems development project and how can it be used to assess and propose the best solutions to the

existing problems or business opportunities?" In helping answer this question, this course gives students an understanding of the tools and techniques that are available, particularly with respect to object-oriented systems analysis, and will introduce the concepts and theory that underlie these techniques and processes. This course also helps students learn how to effectively focus on the question at issue, how to recognize with clarity various points of view and to eliminate ambiguity by clarifying stated or unstated assumptions, how to discover with accuracy the real goals and objectives of a systems development customer, how to effectively collect and manage information in order to identify relevant implications and consequences of existing alternatives.

Vocabulary of Critical Thinking

In this course, students will learn and use the vocabulary of critical thinking which will include an understanding and use of both the Elements of Thought and the Universal Intellectual Standards.

Elements of Thought*:
In this course, we will consider and use eight (8) elements of thought:
1. **Purpose**: Goals and objectives
2. **Question at Issue**: Problem, issue, and misconception
3. **Information**: Facts, data, evidence, observations, reasons, and experiences
4. **Interpretation and Inference**: Solutions and conclusions
5. **Concepts**: Definitions, models, laws, theories and principles
6. **Assumptions**: Axioms, presuppositions, and a-priori facts or knowledge
7. **Implications and Consequences**: Inferences, effects, and outcomes
8. **Point of View**: Perspectives, frames of reference, and orientations

Universal Intellectual Standards*:
In this course, we will consider and use nine (9) universal intellectual standards including **clarity, accuracy, precision, relevance, depth, breadth, logic, significance, and fairness.**

*Paul, R., and Elder, L. (2009). *Critical Thinking: Concepts and Tools* (6th ed.). Tomales, CA: Foundation for Critical Thinking Press

Critical Thinking Process

There are four major aspects of the Applied Critical Thinking Process, termed as the 4 C's: curiosity, connections, creativity, and communication. In this course, the predominant C in the student learning objectives is *creativity*.

Methodology

Seminar and Lecture. This includes class discussions, external reading, library research and writing. You're expected to attend all classes and come to class having read the assigned material and prepared to discuss it.

Important note: This syllabus provides a general guideline for the conduct of this course. However, deviations may be necessary. Changes added later to the syllabus, if any, will be <mark>highlighted in yellow</mark>.

Learning Outcomes

Upon completion of the course, students will be able to:

LO-1: Describe, with *clarity*, the *purpose* and context of, and produce the commonly expected deliverables of systems analysis and design

LO-2: Identify and manage *relevant* requirements (*information*) for an information system

LO-3: Demonstrate, with *clarity*, a deep (*depth*) and broad (*breadth*) understanding of object-oriented *concepts* as well as the ability to *accurately* use them in the context of systems analysis and design

LO-4: Use the Unified Modeling Language (UML) to build *accurate* visual models representing *points of view* of various stakeholders of a new or existing (object oriented) information system

LO-5: Develop the ability to *accurately interpret* available *information* and to determine (*inference*) the *implications and consequences* of using different tools in systems analysis and design

Course Materials

1. **Textbook**
   i. Ashrafi, Noushin & Ashrafi, Hessam. (2009). *Object-Oriented Systems Analysis and Design.* Upper Saddle River, NJ: Pearson Education, Inc., ISBN: 0-13-182408-2

2. **Reference Materials**
   i. Alexander, Ian & Beus-Dukic, Ljerka (2009). *Discovering Requirements: How to Specify Products and Services*. John Wiley & Sons, Inc., ISBN: 978-0-470-71240-5

3. **Class Handouts/Overheads/Slides/Articles/Assignment Instructions/Tool Demos and Tutorials:** Available through Blackboard (https://blackboard.uhcl.edu/webapps/login/)
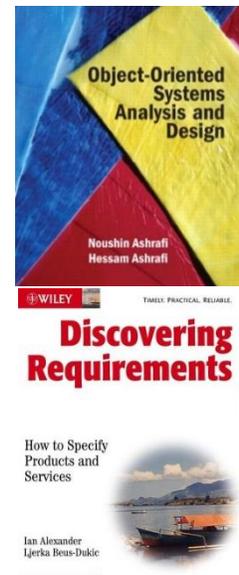
Student Academic Adjustment Policy

The University of Houston System complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance with Section 504 and ADA guidelines, each University within the System strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact your University's student disability services center.

Major Scored Activities

Students taking this course will have to successfully complete a number of scored activities, as described below.

Exam 1 (20%) – First exam will test student's understanding of the concepts covered in Chapters 1 through 5 (student learning outcomes LO-1, LO-2, LO-3, and LO-5). The exam will be individual, in-class, closed-book, closed-notes, and will not require the use of calculators or any electronic devices.

Exam 2 (20%) – Second exam will be comprehensive and will test student's understanding of the concepts covered in Chapters 1 through 13 (student learning outcomes LO-1, LO-2, LO-3, LO-4 and LO-5). Although comprehensive, second exam will focus more on the concepts covered in Chapters 6 through 13. The exam will be individual, in-class, closed-book, closed-notes, and will not require the use of calculators or any electronic devices.

UML Tool Assessment (10%) – This assignment requires each student to select an UML modeling tool and assess it based on a set of 14 evaluation criteria. Upon the completion of this assessment a student will be able to precisely identify the relevant features of a UML Modeling Tool and determine if it is an appropriate tool for analysis and design tasks (student learning outcomes LO-4 and LO-5).

Improvement Proposal (8%) – This assignment requires each student to prepare a short paper proposing 3 novel ideas for improving the system which is the focus of the term project. Upon the completion of this assignment a student will have an in-depth understanding of one of the relevant topics of systems analysis and design (student learning outcomes LO-2 and LO-4, and *creativity*).

The end goal of these activities with respect to Applied Critical Thinking is to develop the student's Intellectual Traits – critical thinkers routinely apply intellectual standards to the elements of thought in order to develop the following intellectual traits:

- Intellectual Integrity
- Intellectual Humility
- Confidence in Reason
- Intellectual Perseverance
- Fair-mindedness
- Intellectual Courage
- Intellectual Empathy
- Intellectual Autonomy

Reporting of Assessment Results

Elements of the major scored activities above will be linked to one or more of the student learning outcomes. The scores associated with these elements will be used in an aggregate form to determine an overall score for each student learning outcome. These scores are indicative of a student's level of achieving the learning outcome. Following levels will be considered:

Excellent:	90% and above
Acceptable:	70% to 89.9%
Unacceptable:	69.9% and below

Exams 1 and 2 will include items requiring imagination and *creativity* for successfully completing them. In order to do well on the exams, the students will have to not only show *creativity* but also *clarity* of thought and *accuracy* of understanding of analysis and design *concepts*. These items will be used to generate an aggregate score for evaluating how well a student is able to use creativity as part of applied critical thinking. The following assessment levels will be considered:

Excellent:	90% and above
Acceptable:	70% to 89.9%
Unacceptable:	69.9% and below

Use of Class Products in Assessment

The University of Houston-Clear Lake may use your work in this class to generate assessment data. Any works used will be used only for educational purposes.

Evaluation Policy

Points & Weighting			Grade Distribution	
Item	Points	Percent	Points	Grade
Individual Assignments			465 or more	A
Exam 1	100	20%	450 - 464	A-
Exam 2	100	20%	437 - 449	B+
UML Tool Assessment	50	10%	415 - 436	B
Improvement Proposal	40	8%	400 - 414	B-
Other In-class Assignments	30	6%	377 - 399	C+
Bonus Points (Folding@Home)	15	3%	363 - 376	C
Team Project			350 - 362	C-
Part 1: List of potential sources and interview guide	10	2%	300 - 349	D
Part 2: List of sources and requirements	15	3%	Less than 300	F
Part 3: Domain dictionary and list of business rules	15	3%		
Part 4: Initial use case list and context diagram	10	3%		
Part 5: Complete use-cases and meta-model diagram	25	5%		
Part 6: Class candidate list and class diagram	25	5%		
Part 7: Dynamic modeling diagrams	25	5%		
Part 8: User interface and ER diagram	25	5%		
Project presentation	20	4%		
Final Project Folder	10	2%		
Total:	**515**	**103%**		

Assignment Submissions

All assignments are due by 8:00 AM on the day following the assigned date. Assignment submissions should be completed through Blackboard. Late submissions are accepted only if not more than 24 hours late and if submitted by email at vlas@uhcl.edu. All late submissions will receive an automatic 50% penalty from the maximum number of points associated with the assignment.

Projects

All students will be required to contribute to a project team during the course of the semester. An individual's score may be significantly lower than the team's score if sub-average peer evaluations are submitted for that specific individual. Please let me know immediately if there are significant issues relating to a team member's participation. You will be required to use a UML modeling tool to construct UML diagrams for the team project. You will be allowed to select the UML modeling tool you wish to use. The first assignment will help you evaluate available UML tools you might want to choose from.

Peer Evaluations

All students will be required to contribute to a project team during the course of the semester. All team submissions should be accompanied by individual peer evaluations. A peer evaluation form to use for these individual peer evaluations will be made available through Blackboard. Filled peer evaluation forms should be submitted by email (with the subject line reading "Evaluation for <Assignment Name>") directly to the Teaching Assistant. Instructions on how to fill an individual peer evaluation are provided on the form posted on Blackboard. The

reason(s) considered for providing a below average evaluation of a team member should be included in the submitted evaluation form. Failure to submit an individual peer evaluation at the time of a team submission will result in the use of a "non-contributing member evaluation form" (posted on Blackboard for reference) instead. No late submissions are allowed for peer evaluation forms.

General Class Policies

- Students are expected to always exhibit a respectful attitude towards other students and towards the instructor. **The instructor has the right to ask any student failing to show a respectful attitude to leave the classroom.**
- Although there is no formal attendance policy, students are expected to attend all classes, except when precluded by emergencies, religious holidays or bona fide extenuating circumstances. Students are responsible for everything discussed in class as well as for participating to any in-class activities offered throughout the semester. Missed in-class activities result in receiving a score of zero and cannot be made up unless a valid reason for missing is documented and arrangements are made for how to make up the missed activity.
- A grade of zero will be assigned on any missed exam unless the instructor is notified in advance, a valid (in the opinion of the instructor) reason for missing is documented (i.e. doctors note, police report), and arrangements are made for how to make up for the missed assignment.
- All work submitted must be typed, not handwritten.
- Students who, for non-academic reasons beyond their control, are unable to meet the full requirements of the course should notify the instructor. Incompletes may be given if a student has ONE AND ONLY ONE outstanding assignment.
- Spirited class participation is encouraged and informed discussion in class is expected. This requires completing readings and assignments **before** class.
- Unless specifically stated by the instructor, all exams, assignments, quizzes, exercises are to be completed by the student alone.
- Copy work from any source without a proper reference will be considered plagiarism and subject to disciplinary action as delineated in the UHCL policies on academic dishonesty.
- Any non-authorized collaboration will be considered cheating and the student(s) involved will have an Academic Dishonesty charge completed by the instructor and placed on file in the Dean of Students' office and the School of Science and Computer Engineering. See excerpt from the Student Handbook below:

Class disruptions

Please arrive for a lecture **before** the scheduled starting time. The ringing, beeping, buzzing of cell phones, watches, and/or pagers, as well as sounds generated by any electronic devices during class time is extremely rude and disruptive to your fellow students and to the class flow. Consequently, the active use of any electronic devices (with the exception of note taking devices) is **NOT** allowed during class. Please turn off all cell phones, watches, and pagers prior to the start of class and ensure that the devices that are used during class do not generate any disruptive sounds. **The instructor has the right to ask students to leave the classroom if disrupting devices are used during class time!**

Communication

E-mail and phone are the preferred ways to communicate with the instructor outside of the classroom. Send all messages to the instructor's email address at <u>vlas@uhcl.edu</u> or call at (281) 283-3878. *Note on email communication*: Same code of conduct and respect as in face-to-face communication should be used for e-mail communication. Do not use chat-type or text messaging style of communication (don't use "r" for "are", "u" for "you", "2" for "to", etc.). Pay attention to spelling and grammar as I expect the body of all email messages received to contain only complete and correct English sentences. Poorly written email messages will not be replied to. All anonymous email messages will be discarded immediately.

Bonus Points
A number of bonus points are offered in this course. Students interested in earning bonus points will have to request a FAH ID and to follow the instructions provided by the instructor on how to earn the bonus points being offered. These points are in addition to the total number of points offered in the course and can be used to compensate the effect of any points lost throughout the semester on assignments and exams.

Academic Honesty
(Abstracted from UHCL's Academic Honesty Policy -
<u>http://prtl.uhcl.edu/portal/page/portal/DOS/Documents_and_Forms/Academic_Honesty_Policy.pdf</u>)

"All students at the University of Houston-Clear Lake are expected to maintain complete honesty and integrity in all academic work attempted while enrolled at the University. This standard of conduct includes reporting incidents of alleged violation of the honesty policy to the instructor involved or, if necessary, to the appropriate academic dean. Each student acknowledges, by the mere act of turning in work for a grade, that he or she has honored the Academic Honesty Code."
"Any conduct or activity by a student intended to earn or improve a grade or receive any form of credit by fraudulent or dishonest means is considered an Honesty Code violation. In addition, engaging in any conduct including the following examples which a reasonable person in the same or similar circumstances would recognize as academic dishonesty is considered a violation. Examples of violations of the Honesty Code include, but are not limited to, the following:
1. Acquiring information:
   a. Acquiring information for any assigned work or examination from any source not authorized by the professor.
   b. Working with another person or persons on any assignment or examination when not specifically permitted by the instructor.
   c. Observing the work of other students during any examination.
   d. Using, buying, selling, stealing, soliciting, copying, or possessing, in whole or part, the contents of an un-administered examination.
   e. Purchasing, or otherwise acquiring and submitting as one's own work any research paper or other writing- assignment prepared by others.
2. Providing information:
   a. Providing answers for any assigned work or examination when not specifically authorized by the instructor to do so.

b. Informing any person or persons of the contents of any examination prior to the time the examination is given.
3. Plagiarism:
   a. Incorporating the work or idea of another person into one's own work without acknowledging the source of that work or idea.
   b. Attempting to receive credit for work performed by another person, including papers obtained in whole or part from individuals or other sources.
   c. Copying copyrighted computer programs or data files belonging to someone else.
4. Conspiracy:
   a. Agreeing with one or more persons to commit any act of academic dishonesty.
5. Fabrication of information:
   a. Falsifying the results obtained from a research or laboratory experiment.
   b. Presenting results of research or laboratory experiments without the research or laboratory experiments having been performed.
   c. Substituting for another student to take an examination or to do any academic work for which academic credit will be received.
   d. Changing answers or grades after an academic work has been returned to the student and claiming instructor error.
   e. Submitting work for credit or taking an examination and employing a technique specifically prohibited by the instructor in that course, even if such technique would be acceptable in other courses.
6. Abuse of resource materials:
   a. Mutilating, destroying, concealing, stealing, or altering any materials provided to assist students in the completion of academic work, including library books, journals, computer files, microfilm and microfiche files, materials placed on reserve by the instructor, or any such materials as the instructor may provide or assign.
   b. Copying any data files or copyrighted computer program(s) for one's own personal use or the use of others.
   c. Copying without permission of the owner, or mutilating or destroying any copyrighted media, printed or electronic (for example, film, video, music, graphics, art, photography, or manuscript).
7. Failure to report:
   a. Failing to report to the instructor any incident in which a student witnesses an alleged violation of the Academic Honesty Code."

> The instructor will investigate any indication or report of potential academic dishonesty in accordance to the UHCL policies. If a student will be found guilty of academic dishonesty then the penalties will include:
> a. The student will fail the course.
> b. The instructor will recommend to the Academic Honesty Council to expel the student from the academic program and from UHCL.

6 Drop Rule Limitation
Students who entered college for the first time in Fall 2007 or later should be aware of the course drop limitation imposed by the Texas 6 drop rule and the census date information for the

semester/session. Dropping this or any other course between the first day of class and the census date for the semester/session does not affect your 6 drop rule count. Dropping a course between the census date and the last day to drop a class for the semester/session will count as one of your 6 permitted drops. You should take this into consideration before dropping this or any other course. Visit www.uhcl.edu/records for more information.

Tentative Schedule

Week	Date	Topics and Deliverables	Readings
1	Jan 16	Syllabus, Course Introduction	
2	Jan 23	Information Systems	Ch 1
		Object Orientation & The Unified Modeling Language	Ch 2
		Team preferences (by email) DUE	
3	Jan 30	Methodology	Ch 3
		Teams formed	
		Individual – UML Tool selected	
4	Feb 6	Gathering Requirements	Ch 4
		Individual – UML Tool Assessment Presentations	
		Individual – UML Tool Assessment Paper DUE	
5	Feb 13	Interviews and Domain Analysis	Ch 5
		(Opt-2/16) Team – Project Part 1: List of Potential Sources and Guide	
6	Feb 20	Behavioral Modeling I: Use Cases: The Basics	Ch 6
		Team – Project Part 2a: List of Sources and Requirements	
		Team – Project Part 2b: Interview report/transcript	
7	Feb 27	Behavioral Modeling II: Developing Use Cases	Ch 7
		Team – Project Part 3: Domain Dictionary and List of Business Rules	
8	Mar 6	**Individual – Exam 1**	
	Mar 9	**Team – Project Part 4: Initial Use Case List and Context Diagram**	
9	Mar 13	**NO CLASS – Spring Break**	
10	Mar 20	Structural Modeling	Ch 8
	Mar 23	**Team – Project Part 5: Complete Use Cases and Meta-Model Diagram**	
11	Mar 27	Dynamic Modeling	Ch 9
		Team – Project Part 6: Class Candidate List and Class Diagram	
12	Apr 3	The Design Challenge	Ch 10
		Application Design I: Flow and Control	Ch 11
		Team – Project Part 7: Dynamic Modeling Diagrams	
	Apr 7	**Last day to withdraw**	
13	Apr 10	Application Design II: The User Interface	Ch 12
14	Apr 17	Application Design III: Database and Persistence	Ch 13
15	Apr 24	**Team – Term Project Presentations**	
		Instructor Evaluations, Review for Final, Semester Wrap Up	
		Team – Project Part 8: User Interface and ER Diagram	
		Individual – Improvement Proposal DUE	
16	May 1	**Team – Project Folder DUE**	
		Individual – Exam 2	