DE LA SALLE UNIVERSITY GOKONGWEI COLLEGE OF ENGINEERING DEPARTMENT OF INDUSTRIAL ENGINEERING

Course Title	:	Cognitive Ergonomics
Course Code	:	COGERG2
Pre-requisite	:	BIOERG1 (Soft), LBYIE3C (Co-requisite)
Pre-requisite to	:	IEMERES(Soft), IEPRODE (Soft)
Credit Unit	:	1 unit (lecture)
Faculty	:	
Term/Time/Room	:	//

Course Description:

This is an introductory course in cognitive ergonomics. Lectures include topics on signal detection theory, vigilance, information processing, learning, memory, mental workload, visual and auditory displays, and usability engineering. The course also relates cognitive limitations to the design of effective products and interfaces.

Learning Outcomes and Graduate Attributes:

Upon the completion of the course, the student is expected to be able to do the following:

EXPECTED	STUDENT OUTCOMES	LEARNING OUTCOMES
LASALLIAN	(SO)	(LO)
GRADUATE		
ATTRIBUTES		
(ELGA)		
As a critical and	C. ability to design a system,	LO1 Analyze beta and sensitivity of
creative thinker	component or process to meet	situations, and recommend on how
	desired needs within realistic	to improve their signal detection and
An innovator and	constraints such as economic,	Vigilance performance.
improvement	environmental, social,	depending on the bits of information
Improvement	political, ethical, health and	presented
	safety manufacturability and	LO3 Deduce and improve on how
	sustainability in accordance	people use memory for
	with standards	remembering
	with standards	LO4 Illustrate how a person process
		controls and displays using his/her
		attention and recommends
		improvement.
		LO5 Analyze a design
		human-computer interfaces using
		usability heuristics
		LO6 Calculate a person's mental
		workload and make suggestions on
		now to improve the mental
		WOIKIOAD.

Final Course Output:

LEARNING OUTCOME (LO)	REQUIRED OUTPUT	DUE DATE
LO1	Case 1: on SDT and Vigilance	Week 4
LO2	Case 2: on Information Theory and Absolute	Week 6
	Judgment	
LO3	Case 3: on Memory	Week 7
LO4	Case 4: Attention, Perception and Displays	Week 8
LO6	Case 5: on Mental Workload	Week 10
LO5	Design Essay: Paper that deals on the analysis	Week 12
	of a product's interface	

Course Assessment Matrix:

Learning Outcomes	Student Outcomes											
	А	В	C	D	Е	F	G	Н	Ι	J	K	L
LO4, LO5			2									

Legend: 1 = Introductory 2=Enabling 3=Demonstrative

Performance Indicator:

C3. Design a solution compliant to standard

4th Hour Activities:

Activity	Allotted No. of Hours
Assignments: Signal detection theory readings and research for	2
case on megamall incident robbery	
Assignments: Vigilance Theory readings and research for	2
megamall incident robbery	
Assignments: Information theory readings	2
Assignment: Absolute Judgment readings and research for case	2
Assignments: Attention readings and research for case	2
Assignments: Memory and Learning readings	2
Assignments: Usability theories research and readings	2
Assignments: Usability testing research for actual samples	2
Term project preparation	4
Total	20 hours

Other Requirements and Assessments: Aside from the required output, the student will be assessed at other times during the term by:

- Cases
- Assignments

Grading System:

Requirements	Percentage
Design Essay	35%
Cases	35%
Assignment	15%
Discussions	5%
Peer evaluation	10%
TOTAL	100%

Learning Plan:

LEARNING	TOPIC	WEE	LEARNING ACTIVITIES
OUTCOME		K	
(LO)	Course everyiow	1 NO.	Discussion
1	Definition of acquitive	1	Guessing signs and symbols
	Definition of cognitive		(asynchronous session)
	ergonomics		
	Model of Human		
	Information Processing		
1	Signal detection theory	1-2	Lecture (Find the hidden object)
			Assignment 1
1	Vigilance	3	Assignment 2
			Case discussion: Megamall robbery
2	Information Theory	4	Reaction time game or
			Information quantification
			Assignment 3
4	Absolute Judgement /	5-6	Assignment 4
	Attention in Perception and		Lecture and discussion
	Display Space (Visual and		Case: Accident due to cempnone
	Audio Displays)		Use Case: Controls and display
			evaluation
			(students will look for samples of
			controls and evaluate in class)
			Attention: (asynchronous)
3	Memory and learning	7	Assignment 5
			Case: Commercial on McDo
			Delivery vs Jollibee Delivery
5	Usability Theories	8	Assignment 6

			Video presentation on Usability Theories Assignment 3
5	Usability Testing	9	Assignment 7 Case on the use of usability heuristic or usability testing
6	Mental workload	10	Assignment 8 Case: Measure a student's mental workload during this pandemic period (asynchronous)
5	Design Essay	11-12	Interface evaluation of a product

Case Format:

- 1. Introduction
- 2. Analysis
- 3. Recommendation
- 4. Conclusion
- 5. References

Note: Case study maximum pages: 10 pages, excluding references. Font size 12, 1.5 spacing. All cases will be composed of groups with maximum of 3 members.

Peer evaluation per case will be submitted. Total the scores for each member of the group.

Case Rubric:

Introduction

10.0 to >8.0 pts Exemplary The introduction was written in an organized manner. All the important details of the case were clearly written and summarized.	8.0 to >5.0 pts Satisfactory The introduction was well written. Most of the important details of the case were written, but some items are missing.	5.0 to >2.0 pts Developing The introduction was not well written. The case has a lot of missing details.	2.0 to >0 pts Beginning The introduction was poorly written. There were only few details of the case that was written
50 to >45.0 pts	45.0 to >30.0 pts	30.0 to >15.0 pts	15.0 to >0.0 pts
Exemplary	Satisfactory	Developing	Beginning
The analysis made use of	The analysis made use of	The analysis made use of	The analysis made
excellent critical thinking	good critical thinking in	average critical thinking	use of poor critical
in the evaluation of the	the evaluation of the	in the evaluation of the	thinking in the
case, all angles of the case	case, most of the angles	case, few angles of the	evaluation of the
were considered. The	of the case were	case were considered.	case. The application
application of the concept	considered. The	The application of the	of the concept was
was clearly explained in	application of the	concept was not clearly	not clearly explained
the case. The evaluation	concept was explained in	explained in the case.	in the case. The

	-							
	using the theories and other literature was comprehensively done.	the case. The evaluation using the theories and other literature was not so comprehensively done.		e evaluation using the cories and other erature was not mprehensive.	evaluation using the theories and other literature was not done.			
	Recommendation		-					
	30.0 to >27.0 pts Exemplary The recommendation done addressed the root cause/s of the case problem. It considered the theory being evaluated and how it should be applied. It is practical, innovative, feasible and easy to implement	27.0 to >20.0 pts Satisfactory The recommendation done addressed some of the root cause/s of the case problem . It considered some of the theory being evaluated and how it should be applied. It is practical, innovative, feasible and not easy to implement		20.0 to >10.0 pts Developing The recommendation done addressed few of the root cause/s of the case problem . It considered few of the theory being evaluated and how it should be applied. It is practical, but not innovative, infeasible and not easy to implement		10.0 to >0 pts Beginning The recommendation done did not address the root cause/s of the case problem . It did not consider the theory being evaluated and how it should be applied. It is impractical, not innovative, infeasible and not easy to implement		
	Similarity Index							
	5.0 to >4.0 pts Exemplary Similarity index is 0-5%	4.0 to >3.0 pts Satisfactory Similarity index is 6-10 ⁶	%	3.0 to >2.0 ptsDeveloping%Similarity index is 11-1		2.0 to >0 pts Beginning Similarity ind 16-20%	lex is	
Ì	References5.0 to >4.0 pts4.0 to >3.0 ptsExemplarySatisfactoryAt least 5 journal referencesAt least 3 journalwere properly discussed and cited in the paper.properly discussed and cited in the paper				î			
			3.0 De At ref dis paj	3.0 to >2.0 pts Developing At least 1 journal references were properly discussed and cited in the paper.		>0 pts ining ferences		

Assignment Rubric

Assignment Rubric									
Criteria		Ratings							
Completeness	10.0 pts Exemplary All details are complete. All questions are answered. All references are cited	8.0 pts Satisfactory All questions are answered. Not all details are given. Some references are given.	4.0 pts Developing Few questions are answered Few details are given No references	2.0 pts Beginning No questions are answered. Other details are given not related to the topic No or wrong references	10.0 pts				

Total Points: 10.0

Discussion Rubric

Discussion Rubr	Discussion Rubric									
Criteria	Ratings							Pts		
Promptness and Initiative	3.0 pts Exemplary Consistently responds to postings in less than 24 hours; demonstrates good self-initiative		2.0 pts Satisfactory Responds to most postings within a 24 hour requires occasional prompting to post		2.0 pts 1.0 pts 0.0 pts Satisfactory Developing Beginning Responds to most postings within a 24 hour period; requires occasional prompting to post Responds to most postings several days after initial discussion; limited initiative Does not respond to rarely participates from the participa		1.0 pts Developing r period; Responds to most postings several days aff initial discussion; limited initiative		0.0 pts Beginning Does not respond to most postings; rarely participates freely	3.0 pts
Relevance of Post	3.0 pts Exemplary Consistently posts topics related to discussion topic; cites additional references related to topic	2.0 pt Satist Frequ discu of top	2. Opts Satisfactory Frequently posts topics that are related to discussion content; prompts further discussion of topic		1.0 pts Developing Occasionally posts off topics; most posts are short in length and offer no further insight into the topic		0.0 pts Beginning Posts topics which do not relate to the discussion content; makes short or irrelevant remarks			
Expression Within the Post	3.0 pts Exemplary Expresses opinions and ideas in a clear and concise manner with obvious connection to topic occasional lack of connection to top		2.0 pts Satisfactory Opinions and ideas are stately clearly with occasional lack of connection to topic	1	1.0 pts Developing Unclear connection to topic evidence minimal expression of opinions or ide	tin Is	0.0 pts Beginning Does not express opinions or ideas clearly; no connection to topic	3.0 pts		
Contribution to the Learning Community	3.0 pts Exemplary Aware of needs of community; frequently attemp motivate the group discussion; presents creative approaches to the topic	ts to	2.0 pts Satisfactory > Frequently attempts to direct the discussi- present relevant viewpoints for considera group: interacts freely		1.0 pts Developing on and to Occasionally makes meaningful reflection group's efforts; marginal effort to becom involved with group		0.0 pts Beginning Does not make effort to participate in learning community as it develops; seems indifferent			
							Total Po	ints: 12.0		

Design Essay

(1.5 spacing spaced <u>excluding appendix</u>, Times New Roman 12) Format of the paper: Maximum pages 8 pages.

- 1. Introduction In this section you have to describe the interface to be assessed including users and functions; also, include a picture of the interface
- 2. Design assessment discuss the strengths and weaknesses of the interface citing theories in interface design and Nielsen's heuristics
- 3. Design recommendation propose ways of improving the weaknesses of the interface. You should include your design illustration in the appendix

Peer evaluation Rubric

At the end each case, each member will evaluate other members of the team using the form below.

Criteria		2	3	4	5
		Not really	Undecided	Somewhat	Very much
1. Engages with the work of the team					
2. Respects the opinions/input of others into decision making					
3. Willing to take on a role; completes responsibilities on time					
4. Actively attempts to ensure the inclusion of members in project					
5. Acts assertively and avoids passivity					
6. Participates in literature search					
7. Participates in writing the report					
8. Checks and edits reports prepared by the team					
TOTAL					

Example of Peer Evaluation Format to be submitted, this is to be submitted every case until the design essay. But need to evaluate each member per case.

	Member 1	Member 2
Case 1	40	34
Case 2	40	25
Case 3	40	40
Case 4	40	35
Case 5	40	40
Case 6	40	40
Design Essay	40	25
Average	40	34.14

CDITEDIA	EVEMDIADY	SATISFACTORY	DEVELODING	DECIMINIC	Dating	
	EALWIPLAKY	SATISFACTURY	DEVELOPING	BEGINNING	Kating	
Introduction	Function of the interface was described including a picture Context of use discussed in detail	Function of the interface was described including a picture Context of use not discussed in detail	Function of the interface was described including a picture Context of use not described, only	The function of the interface was described without a picture or context of use No literature	10	
	with good	with literature but	few literature was	No incluture		
	literature	some may be lacking		0.2.5		
Design assessment (E2)	Assessment done was comprehensive. Theories used were relevant. Related studies cited well.	Assessment done was not comprehensive. Theories used were relevant. Related studies cited but some are not relevant.	Assessment done was too superficial and did not use theories learned in class. Related studies cited but some are not relevant.	Assessment done was too superficial and did not use theories learned in class. No related studies cited.	40	
	40-30.67	18.67-30.66	18.66-6.68	0-6.67		
Design	Proposed design considered all weaknesses of the current design.	Proposed design considered only the major weaknesses mentioned.	Proposed design only considered a few of the weaknesses identified without explanation.	Proposed design did not consider previous assessment.		
recommendation (E2)	20-14.68	14.67-10.68	10.67-5.34	0-5.33	40	
	Proposed design is practical, unique, and feasible with an illustration.	Proposed design is practical and feasible with an illustration.	Proposed design is practical but not feasible with an illustration.	Proposed design is impractical with illustration.		
	20-14.68	14.67-10.68	10.67-5.34	0-5.33		
Mechanics and Grammar	Paper has no error in grammar and very coherent.	The paper has one or two grammatical errors and coherent.	The paper has three to five grammatical errors and difficult to read.	The report is barely understandable with a lot of grammatical errors.	5	
	5	3-4	1-2	0		
References	At least 5 journal references were properly discussed and cited in the paper.	At least 3 journal references were properly discussed and cited in the paper.	At least 1 journal references were properly discussed and cited in the paper.	No references cited.	5	
	5	3-4	1-2	0		

Rubric for Assessment of Design Essay

On-line Class Policies:

- 1. Any concerns or problems on the cases, the student should immediately notify the professors.
- 2. The student should notify the professor before or during the deadline of the case if they cannot submit due to justifiable reasons.
- 3. Cheating in any form in any course requirements will be equivalent to a grade of zero for the course.
- 4. Similarity index of above 20% means a zero grade for that respective requirement.
- 5. Late assignments will be accepted only a week after the due date of assignment. There will be **20% deductions** for late submissions.
- 6. Every lecture, there will be a graded discussion.
- 7. All students should follow web conferencing and Internet etiquette.

Textbook:

Wickens, C. D., Helton, W.S., Hollands, J. G. and Banbury S. (2021). *Engineering Psychology and Human Performance* (5th ed.). Routledge.

References:

Anderson, J. (2020) Cognitive Psychology and Its Implications Ninth Edition. Worth Publishers.

- Barnum, C. (2020). Usability Testing Essentials: Ready, Set ... Test!: Ready, Set... Test! 2nd Edition. Morgan Kaufmann
- Bridger, R. (2017). Introduction to ergonomics (4th ed.). London: CRC Press.
- Eysenck, M and Keane, M. (2020). *Cognitive Psychology: A Student's Handbook 8th Edition*. Psychology Press
- Geisen, E. and Bergstrom, J. R. (2016). Usability Testing for Survey Research 1st Edition. Morgan Kaufmann
- Goldstein, E. B. and Brockmole J. (2016). Sensation and perception (10th ed.). Cengage Learning
- Goldstein, E.B. (2018). Cognitive Psychology: Connecting Mind, Research, and Everyday Experience 5th Edition. Cengage Learning
- Lee, J., Wickens, C., Liu, Y. and Boyle, L. (2017) *Designing for People: An Introduction to Human Factors Engineering 3rd Edition*. CreateSpace Independent Publishing Platform

Online Reading Materials

https://www.pressreader.com/philippines/philippine-daily-inquirer-1109/20170521/281762744193886 https://verafiles.org/articles/inadequate-road-signs-speeding-driver-factors-tanay-crash

https://www.gmanetwork.com/news/news/specialreports/292964/what-happened-in-the-megamall-robber y/story/

https://www.rappler.com/newsbreak/iq/230002-what-makes-good-political-advertisement-ads https://www.nngroup.com/articles/ten-usability-heuristics/

https://www.nngroup.com/articles/usability-testing-101/

https://www.interaction-design.org/literature/topics/usability

https://www.interaction-design.org/literature/topics/ux-design

https://usabilitygeek.com/the-difference-between-usability-and-user-experience/

https://usabilitygeek.com/user-experience/

<u>https://courses.lumenlearning.com/austincc-learningframeworks/chapter/chapter-9-memor</u> v-and-information-processing/

Videos

https://www.youtube.com/watch?v=Kn7Uf3iPZsY https://www.youtube.com/watch?v=nexr56Y9mEA https://www.youtube.com/watch?v=hydCdGLAh00&feature=emb_title https://www.youtube.com/watch?v=fCu4Tk2w6g4

Online Resources:

Cognitive ergonomics: a definition. Retrieved from

http://www.haworth.com/en-us/Knowledge/Workplace-Library/Documents/Cognitive-Er gonomics-A-Definition.pdf

Heeger, D. (2007). Signal detection theory. Retrieved from http://www.cns.nyu.edu/~david/handouts/sdt/sdt.html

Learning and memory. (2010). Retrieved from

http://nwlink.com/~donclark/hrd/learning/memory.html

Details of a usability study. (2011). Retrieved from http://www.user.com/testing-details.htm

Usability Professionals Association. http://www.upassoc.org/

Darnell, M. (2010). Bad human factors designs. Retrieved from http://www.baddesigns.com/

Course Title (Code):	Date Effective:	Date Revised:	Prepared by:	Approved by:
Cognitive Ergonomics (COGERG2)	1st Term AY 2020-2021	2021-10-08	Jetungsee	
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