



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Introduction to Computing

Course Code: IT064

1. General information

Course designation	This course introduces students to a broad knowledge of the computer science and information technology fields. Topics covered will include basic computer concepts, components of computer hardware and operating systems software as well as data and telecommunications systems. Students can use the knowledge they've gained to strengthen their future-oriented job.
Semester(s) in which the course is taught	1,3
Person responsible for the course	Dr. Nguyen Trung Ky
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 hours. Contact hours: 45 hours (lecture). Private study including examination preparation, specified in hours: 90 hours.
Credit points	Number of credits: 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	None
Course objectives	This course is to provide fundamentals and basic concepts of computer science and engineering, basics of Computing such as basic concepts, models, trends in industry. Introduction to majors and curricula, career path of all majors in computing, career orientation, job requirements and career opportunities in industry are also included in this course.
Course learning outcomes	CLO1 - Demonstrate an in-depth understanding of fundamental knowledge and history of computing, all career paths in computing and learning methodologies in university.

	CLO2 - Describe basic hardware and software concepts and basic computing terminologies CLO3 - Make a plan for his/her own future career and his/her works CLO4 - Seek information from Internet and manage his/her information. CLO5 - Follow the discussions of instructors and classmates.																														
	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1, CLO2.</td></tr> <tr> <td>Skill</td><td>CLO3, CLO4.</td></tr> <tr> <td>Attitude</td><td>CLO5.</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1, CLO2.	Skill	CLO3, CLO4.	Attitude	CLO5.																						
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Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>The Overall Picture</td><td>1</td><td>I</td></tr> <tr> <td>Data and Information</td><td>2</td><td>T, U</td></tr> <tr> <td>Hardware</td><td>2</td><td>T, U</td></tr> <tr> <td>Algorithm and Programming Language</td><td>2</td><td>T, U</td></tr> <tr> <td>Operating System</td><td>2</td><td>T, U</td></tr> <tr> <td>Networking</td><td>2</td><td>T, U</td></tr> <tr> <td>Information System and Application</td><td>2</td><td>T, U</td></tr> <tr> <td>Majors and Curriculum, Career Paths and Orientation Careers at a Hardware, Network and Software Company</td><td>1</td><td>I</td></tr> <tr> <td>Revision</td><td>1</td><td></td></tr> </tbody> </table> <p>Examination forms</p> <p>Multiple-choice questions, short-answer questions</p> <p>Study and examination requirements</p> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>	Topic	Weight	Level	The Overall Picture	1	I	Data and Information	2	T, U	Hardware	2	T, U	Algorithm and Programming Language	2	T, U	Operating System	2	T, U	Networking	2	T, U	Information System and Application	2	T, U	Majors and Curriculum, Career Paths and Orientation Careers at a Hardware, Network and Software Company	1	I	Revision	1	
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Reading list	<p>[1] Nell Dale and John Lewis, "Computer science: Illuminated", 7th Edition, Jones & Bartlett Learning Publisher, ISBN-13 978-1284155617, 2019.</p> <p>[2] J. Glenn Brookshear, "Computer Science: An Overview", 12th Edition, Pearson Publisher, ISBN-13 978-0133760064, 2014.</p> <p>[3] Peter Wentworth, Jeffrey Elkner, "How to Think Like a Computer Scientist: Learning with Python 3 Documentation", 3rd Edition, Allen B. Downey and Chris Meyers, Green Tea Press Publisher, ISBN-13 978-0971677500, 2020.</p>																														

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X			X		
2	X			X		
3	X					

4	X			
5				X

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	The Overall Picture	1		Lecture, Discussion	[1]. Chapter 1
2	Binary Values and Number System	1, 2	Quiz.	Lecture, In-class quiz	[1]. Chapter 2
3	Data Representation	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 3
4	Gates and Circuits	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 4
5	Computing Components	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 5
6	Low-level Programming Languages and Pseudocode	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 6
7	Midterm				
8	Problem Solving and Algorithm, Abstract Data Types and Subprograms	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 7,8
9	Object-oriented Design and High-level Programming Languages	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 9
10	Operating System and File System and Directory	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 10, 11
11	Information System, Artificial Intelligence	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 12, 13
12	Simulation, Graphics, Gaming, and Other Programming Networks	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 14, 15
13	The World Wide Web Computer Security	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 16, 17
14	Majors and Curriculum, Career Paths and Orientation, Careers at Hardware, Network and Software Company	3, 4		Lecture, Discussion	
15	Revision			Review-test	
16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Quiz (10%)	25%	25%	33.3%	33.3%	25%
Midterm examination (30%)	25%	25%			25%
Projects/Presentations/ Report (20%)	25%	25%	33.3%	33.3%	25%
Final examination (40%)	25%	25%	33.3%	33.3%	25%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

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- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. [↴](#)

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports

Student:	HW/Assignment:	Date:	Evaluator:	Max.	Score	Comments
Technical content (60%)						
Abstract clearly identifies purpose and summarizes principal content	10					
Introduction demonstrates thorough knowledge of relevant background and prior work	15					
Analysis and discussion demonstrate good subject mastery	30					
Summary and conclusions appropriate and complete	5					
Organization (10%)						
Distinct introduction, body, conclusions	5					
Content clearly and logically organized, good transitions	5					
Presentation (20%)						
Correct spelling, grammar, and syntax	10					
Clear and easy to read	10					
Quality of Layout and Graphics (10%)						
TOTAL SCORE	100					

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Capstone	Milestone	Benchmark

		4	3	2	1
	Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.
		Capstone	Milestone	Benchmark	
		4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Oral communication value rubric for evaluating presentation tasks:

Source: Association of American Colleges and Universities

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: C/C++ Programming

Course Code: IT116

1. General information

Course designation	Learning the basics of programming
Semester(s) in which the course is taught	2
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	This course concentrates on learning the basics of programming languages which are the foundations for further studies in IT. The course enables students to get familiar with C programming language. The course covers all basic C data structures, control flows, simple data structures as well as other advanced topics which include pointers, bit operators, file processing, dynamic data types.
Course learning outcomes	CLO 1. Understand programming languages and applications, how applications work CLO 2. Understand basic data structure and control flow of C programming language

	CLO 3. Able to write applications using C	
	Competency level	Course learning outcome (CLO)
Knowledge	1	
Skill	2, 3	
Attitude		
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)	
Topic	Weight	Level
Introduction to Computer and Programming Language	1	I
Introduction to C Programming Language	1	I, T
C Basic Data Types	1	T, U
Control Flow: Branching statements	1	T, U
Control Flow: Iteration	1	T, U
Functions	1	T, U
Arrays	1	T, U
Pointers	1	T, U
String	1	T, U
File Processing	1	T, U
Dynamic Memory Allocation	1	T, U
Struct, Union	1	T, U
Bitwise Operation	1	T, U
Linked list, Stack, Queue	1	T, U
Binary tree	1	T, U
Examination forms	Short-answer questions, Programming exercises	
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.	
Reading list	1. Paul Deitel, C How to Program 8th, 2016	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SL0T	1	2	3	4	5	6
1	x					
2		xxx				
3		xxx				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Computer and Programming Language	1	Quiz	Lecture	1
2	Introduction to C Programming Language	1	Quiz	Lecture	1
3	C Basic Data Types	1	Quiz	Lecture	1
4	Control Flow: Branching statements	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
5	Control Flow: Iteration	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
6	Functions	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
7	Array	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
8	Pointers	2, 3	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
Midterm					
9	String	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
10	File Processing	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
11	Dynamic Memory Allocation	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
12	Struct, Union	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
13	Bitwise Operation	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1

14	Linked list, Stack, Queue	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
15	Binary tree	2, 3	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1

Final

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz / Assignment (10%)	50%	10%	10%
Labs (20%)	10%	30%	30%
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	10%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports

Student:	HW/Assignment:	Date:	Evaluator:	Max.	Score	Comments
Technical content (60%)						
Abstract clearly identifies purpose and summarizes principal content	10					
Introduction demonstrates thorough knowledge of relevant background and prior work	15					
Analysis and discussion demonstrate good subject mastery	30					
Summary and conclusions appropriate and complete	5					
Organization (10%)						
Distinct introduction, body, conclusions	5					
Content clearly and logically organized, good transitions	5					
Presentation (20%)						
Correct spelling, grammar, and syntax	10					
Clear and easy to read	10					
Quality of Layout and Graphics (10%)						
	TOTAL SCORE	100				

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	2
Explanation of issues	<p>Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.</p>	<p>Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.</p>	<p>Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.</p>
Evidence Selecting and using information to investigate a point of view or conclusion	<p>Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.</p>	<p>Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.</p>	<p>Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as assumptions, identified when presenting a position.</p>
Influence of context and assumptions	<p>Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.</p>	<p>Identifies own and others' assumptions and several relevant contexts when presenting a position.</p>	<p>Questions some assumptions, identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).</p>
Student's position (perspective, thesis/hypothesis)	<p>Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).</p>	<p>Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).</p>	<p>Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.</p>
Conclusions and related outcomes (implications and consequences)	<p>Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.</p>	<p>Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.</p>	<p>Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.</p>

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone			Benchmark 1
		3	2	1	
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and uninteresting and do not support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understanding of the presentation, and speaker appears uncomfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understanding of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that does not support the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Theoretical Models in Computing

Course Code: IT131

1. General information

Course designation	This course is oriented to those undergraduate students who require a working knowledge of numerical methods
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	This course is oriented to those undergraduate students who require a working knowledge of numerical methods. Topics to be covered include solving nonlinear equations and linear systems, interpolation and least square method, numerical evaluation of derivatives, integral and solution of differential equations. The focus will be on understanding the solving techniques and the engineering meaning of diver problems, and not on rigorous profs. ♦
Course learning outcomes	CLO 1. Solve numerically nonlinear equations by bisection, iterative and Newton methods.

	<p>CLO 2. Solve big linear systems by exact and iterative methods.</p> <p>CLO 3. Fit data by interpolation polynomials, Spline ♦ polynomials and least square methods.</p> <p>CLO 4. Evaluate numerically derivatives and integrals.</p> <p>CLO 5. Solve numerically Boundary value problems by Euler, Euler improved and Finite Difference methods.</p> <p>CLO 6. Study diverse engineering problems by numerical methods</p>																														
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Reading list	<ol style="list-style-type: none"> 1. Steven C. Chapra, Raymond P. Canale, Numerical methods for engineers 6th, 2008 																														

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x	x				
2	x					
3	x					
4		x				
5	x					
6		x				

1.

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Chapter 1. Introduction			lecture, exercises	
2	Chapter 2. Errors & Taylor Series	1	Quiz, Lab, Exam	lecture, exercises, lab	
3	Chapter 3. Roots of Non-linear Equations	1	Quiz, Lab, Exam	lecture, exercises, lab	
4	Chapter 4. Linear Algebraic Equations	2	Quiz, Lab, Exam	lecture, exercises, lab	
5	Chapter 5. Optimization	3	Quiz, Lab, Exam	lecture, exercises, lab	
6	Midterm				
	Chapter 6. Curve Fitting & Interpolation	4	Quiz, Lab, Exam	lecture, exercises, lab	
7	Chapter 7. Numerical Differentiation and Integration	5	Quiz, Lab, Exam	lecture, exercises, lab	
8	Chapter 8. Ordinary Differential Equations	6	Quiz, Exam	lecture, exercises, lab	
9	Chapter 9. Partial Differential Equations	6	Quiz, Exam	lecture, exercises, lab	
10	Final exam				

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Quiz (10%)	20%	20%	20%	20%	20%	20%
Labs (20%)	30%	30%	30%	30%	30%	30%
Midterm examination (30%)	50%	50%				
Final examination (40%)			50%	50%	50%	50%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↴

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports					
Student:	HW/Assignment:	Evaluator:	Max.	Score	Comments
Technical content (60%)					
Abstract clearly identifies purpose and summarizes principal content	10				
Introduction demonstrates thorough knowledge of relevant background and prior work	15				
Analysis and discussion demonstrate good subject mastery	30				
Summary and conclusions appropriate and complete	5				
Organization (10%)					
Distinct introduction, body, conclusions	5				
Content clearly and logically organized, good transitions	5				
Presentation (20%)					
Correct spelling, grammar, and syntax	10				
Clear and easy to read	10				
Quality of Layout and Graphics (10%)	10				
TOTAL SCORE	100				

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	1

		Issue/problem to be considered critically is stated clearly and described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.
Explanation of issues				
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>		Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions		Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).
Student's position (perspective, thesis/hypothesis)		Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.
Conclusions and related outcomes (implications and consequences)		Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	4	3	Milestone	2	Benchmark	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Discrete Mathematics

Course Code: IT153

1. General information

Course designation	The course provides students the ability to reason and think mathematically and logically; and apply this ability to analyze and solve discrete practical problems in Computer Science and IT.
Semester(s) in which the course is taught	4
Person responsible for the course	Assoc. Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	Compulsory (NE, CE, CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	C/C++ Programming Calculus 1, 2
Course objectives	This course provides students the based knowledge of discrete mathematics. To develop the ability to reason and think mathematically and logically; and to apply this ability to analyzing and solving discrete practical problems in computer science. This is an application-oriented course based upon the study of events that occur in small, or discrete in computer science, segments in

	<p>business, industry, government and the digital areas. Students will be introduced to the mathematical tools of logic and set theory, counting, number theory, and graph theory. Practical applications will be introduced throughout the course</p> <p>CLO 1. Understand and apply count/enumerate objects in a systematic way.</p> <p>CLO 2. Understand mathematical reasoning in order to read, comprehend and construct mathematical arguments; Understand to work with discrete structures and practical problems in computer science and IT</p> <p>CLO 3. Apply algorithm thinking and modeling; Apply knowledge in computer science for problems solving</p> <p>CLO 4. Have a sense of preparation of good mathematical knowledges to approach and solve problems in computer science and information technology.</p>																																													
Course learning outcomes	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1, CLO2</td></tr> <tr> <td>Skill</td><td>CLO2, CLO3</td></tr> <tr> <td>Attitude</td><td>CLO4</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1, CLO2	Skill	CLO2, CLO3	Attitude	CLO4																																					
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Reading list	1. Kenneth H. Rosen, Discrete Mathematics and Its Applications 8 th edition, 2019. 2. Oscar Levin, Discrete mathematics An Open Introduction. 3 rd edition, 2019. 3. Vietnamese book: N.V.Sinh, T.M.Hà, N.T.T.Sang, N.M.Quân, “Nền tảng Toán học trong Công nghệ Thông tin”, NXB - Đại học Quốc gia TPHCM, ISBN: 978-604-73-6518-0, 2018.
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2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

		SLO						
		CLO	1	2	3	4	5	6
1	X	X						
2	X	X						
3		X						
4							X	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Course syllabus and introduction; Logic and propositions	1,2	Questions and answers	Lecture, Discussion, In-class exercises	[1, 2]
2	Logic and propositions (continue)	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
3	Propositional Equivalences; predicates and quantifiers	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
4	Nested Quantifiers and Methods of Proof	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
5	Induction and recursion	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
6	Number of theory	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2]
7	Number of theory (continue)	2,3,4	Quiz, Homework,	Lecture, Discussion,	[1, 2]

			Midterm exam	In-class exercises	
8	Counting: part 1, 2; midterm review	2,3,4	Quiz, Homework, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
9	Midterm examination				
9	Counting: part 3	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2]
10	Advanced counting	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2]
11	Boolean algebras	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
12	Graph theory	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
13	Optimal problem solving on graphs	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
14	Introduction and application of tree	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
15	Search on tree; review for final exam	2,3,4	Quiz, Homework, Final exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
1	Final examination				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz/Homework/Assignment (25%)	20%	30%	30%	20%
Midterm examination (30%)	25%	25%	25%	25%
Final examination (45%)		30%	40%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone	Milestone	Benchmark
	4	3	2
Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is partially observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	and speaker appears polished and confident.	and speaker appears comfortable.	understandable, and speaker appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Digital Logic Design

Course Code: IT067

1. General information

Course designation	Provide fundamentals of logic design, such as: number presentation and codes, Boolean algebra and basic tools for design with combinational and sequential digital logic.
Semester(s) in which the course is taught	3
Person responsible for the course	Assoc. Prof. Dr. Dinh Duc Anh Vu
Language	English
Relation to curriculum	CS, IT: Compulsory
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 135 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) Private study including examination preparation, specified in hours: 90
Credit points	Number of credits : 3 Lecture: 3 Laboratory: 0
Required and recommended prerequisites for joining the course	This course is to provide fundamentals of logic design, such as: number presentation and codes, Boolean algebra and basic tools for design with combinational and sequential digital logic.
Course objectives	CLO 1. Explain the presentation of number, codes systems. CLO 2. Demonstrate the operation of arbitrarily basic combinational and sequential circuits. CLO 3. Design basic combinational and sequential circuits.
Course learning outcomes	

	CLO 4. Follow the discussions of instructors and classmates.																					
	Competency level Course learning outcome (CLO)																					
Knowledge	CLO1, CLO2, CLO3																					
Skill	CLO3																					
Attitude	CLO4																					
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th> <th>Weight</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td>Number systems, arithmetic and codes</td> <td>6</td> <td>I,T</td> </tr> <tr> <td>Boolean algebra and Logic Gates</td> <td>9</td> <td>I,T</td> </tr> <tr> <td>Combinational Circuits</td> <td>9</td> <td>T,U</td> </tr> <tr> <td>Sequential logic and flip-flops</td> <td>9</td> <td>T,U</td> </tr> <tr> <td>Arithmetic logic Circuits</td> <td>6</td> <td>T,U</td> </tr> <tr> <td>Counters, stacks and registers</td> <td>6</td> <td>I,T</td> </tr> </tbody> </table> <p>Examination forms Multiple-choice questions, short-answer questions</p> <p>Study and examination requirements Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>	Topic	Weight	Level	Number systems, arithmetic and codes	6	I,T	Boolean algebra and Logic Gates	9	I,T	Combinational Circuits	9	T,U	Sequential logic and flip-flops	9	T,U	Arithmetic logic Circuits	6	T,U	Counters, stacks and registers	6	I,T
Topic	Weight	Level																				
Number systems, arithmetic and codes	6	I,T																				
Boolean algebra and Logic Gates	9	I,T																				
Combinational Circuits	9	T,U																				
Sequential logic and flip-flops	9	T,U																				
Arithmetic logic Circuits	6	T,U																				
Counters, stacks and registers	6	I,T																				
Reading list	<ol style="list-style-type: none"> Ronald J. Tocci, Neal S.Widmer, Digital Systems Principles and Applications, Prentice Hall Inc (2007) J.F. Wakerly, Digital Design: Principles & Practices 4th, 2004 																					

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO				
CLO	1	2	3	4	5
1	X				
2	X				
3		X			
4	X	X			

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1,2	Number systems, arithmetic and codes	CLO1	Midterm Exam	Reading Group Presentation	Textbooks

3,4,5	Boolean algebra and Logic Gates	CLO1	Midterm Exam	Reading Lecture	Textbooks Lecture notes
	Midterm				
6,7,8	Combinational Circuits	CLO2,CLO4	Quiz Final Exam	Reading Lecture Discuss	Textbooks Lecture notes
9,10,11	Sequential logic and flip-flops	CLO2,CLO4	Exercise Final Exam	Reading Lecture Discuss	Textbooks Lecture notes
12,13	Arithmetic logic Circuits	CLO3,CLO4	Exercise Final Exam	Reading Lecture Discuss Exercise	Textbooks Lecture notes
14,15	Counters, stacks and registers	CLO3,CLO4	Exercise Final Exam	Reading Lecture Discuss	Textbooks Lecture notes
	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Midterm examination (30%)	30%			
Final examination (40%)		20%	20%	
Exercises/ Quiz (30%)		10%	10%	10%

Note: %Pass: Target that 90% of students having scores greater than 50 out of 100.

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- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↵

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports		
Student:	HW/Assignment:	Evaluator:
	Max.	Score
Technical content (60%)		
Abstract clearly identifies purpose and summarizes principal content	10	
Introduction demonstrates thorough knowledge of relevant background and prior work	15	
Analysis and discussion demonstrate good subject mastery	30	

Summary and conclusions appropriate and complete	5	
Organization (10%)		
Distinct introduction, body, conclusions	5	
Content clearly and logically organized, good transitions	5	
Presentation (20%)		
Correct spelling, grammar, and syntax	10	
Clear and easy to read	10	
Quality of Layout and Graphics (10%)		
	10	
TOTAL SCORE		100

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	2
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position	Identifies own and others' assumptions and several relevant contexts when presenting a position	Shows an emerging awareness of present assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa)

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Digital Logic Design Lab

Course Code: IT099

1. General information

Course designation	This subject covers the fundamental knowledge of digital logic design laboratory
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Ly Tu Nga
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 60 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 30 (laboratory) Private study including examination preparation, specified in hours: 30
Credit points	Number of credits : 1 Lecture: 0 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design
Course objectives	This course provides students the fundamentals of digital logic design concepts, a sequence of laboratory experiments to present and illustrate theory of digital logic design involving Logic gates, Combinational logic circuit, MSI combinational logic circuit, Flip Flops and Counters, Counter ICs, and Shift register. Students apply contemporary agile requirements analysis, implementation and testing practices to digital logic design project work in small teams.
Course learning outcomes	CLO 1. use laboratory equipment in digital logic design.

	<p>CLO 2. design, construct, analyze, and troubleshoot simple combinational and sequential circuits.</p> <p>CLO 3. measure and record the experimental data, analyze the results, and prepare a laboratory report for submission.</p> <p>CLO 4. Have an opportunity to exam case studies to understand the professional and ethical responsibility as an engineer.</p>																								
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th> <th>Weight</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td>Logic gates and combinational logic</td> <td>2</td> <td>I,T</td> </tr> <tr> <td>MSI combinational logic</td> <td>1</td> <td>T,U</td> </tr> <tr> <td>MSI Combinational logic (cont.)</td> <td>1</td> <td>T,U</td> </tr> <tr> <td>Flip flops and counters</td> <td>2</td> <td>T,U</td> </tr> <tr> <td>Counter ICs (part I)</td> <td>1</td> <td>T,U</td> </tr> <tr> <td>Counter ICs (part II)</td> <td>1</td> <td>T,U</td> </tr> <tr> <td>Shift Register</td> <td>2</td> <td>T,U</td> </tr> </tbody> </table> <p>Examination forms</p> <p>Short-answer questions</p> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions.</p> <p>Study and examination requirements</p> <p>Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p> <p>Reading list</p> <ul style="list-style-type: none"> [1] M.M. Mano and M.D. Ciletti, Digital Design 4th, 2007 [2] J.F. Wakerly, Digital Design: Principles & Practices 4th, 2004 [3] R.J Tocci and N.S. Widner, Digital Systems - Principles and Applications 8th, 2001 	Topic	Weight	Level	Logic gates and combinational logic	2	I,T	MSI combinational logic	1	T,U	MSI Combinational logic (cont.)	1	T,U	Flip flops and counters	2	T,U	Counter ICs (part I)	1	T,U	Counter ICs (part II)	1	T,U	Shift Register	2	T,U
Topic	Weight	Level																							
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Flip flops and counters	2	T,U																							
Counter ICs (part I)	1	T,U																							
Counter ICs (part II)	1	T,U																							
Shift Register	2	T,U																							

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO	1	2	3	4	5	6
CLO	1	✓	✓	✓	✓	✓	✓
1	✓	✓	✓	✓	✓	✓	✓
2	✓	✓	✓	✓	✓	✓	✓
3			✓	✓	✓	✓	✓
4			✓	✓	✓	✓	✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Teaching and Learning activities	Assessments	Resources
1	Logic gates and combinational logic	CLO 1,3	-Practice and demo -Class discussion	-Report	[1,2]
2	MSI combinational logic	CLO 2,3	-Practice and demo -Class discussion	-Report	[1,2]
3	MSI Combinational logic (cont.)	CLO 2,3	-Practice and demo -Class discussion	-Report	[1,2]
5	Flip flops and counters	CLO 2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
6	Counter ICs (part I)	CLO 2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
7	Counter ICs (part II)	CLO 2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
8	Shift Register	CLO 2,3,4	-Practice and demo -Class discussion	-Report	[1,3]
9	Final exam	Practice	Written exam		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Final examination (30%)	30%	30%	30%	30%
Exercises/ Quiz (70%)	70%	70%	70%	70%

- 1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. [↴](#)

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Evaluator:	
		Max.	Score
Technical content (60%)			Comments
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		

Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone	Milestone	Benchmark	
	4	3	2	1
	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/presentation or establishes the	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that supports the presentation or establishes the presenter's credibility/presentation or establishes the	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/authority on the topic.

		presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Object-Oriented Programming

Course Code: IT069

1. General information

Course designation	This subject introduces students to the object-oriented programming from basic notions to professional principles for designing an object-oriented software.
Semester(s) in which the course is taught	3
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Compulsory (all programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Prerequisite course of OOP: C/C++ Programming
Course objectives	Introduction to object-oriented programming and design. Topics include core terminologies and basic design principles of object-oriented programming such as classes, objects, abstraction, encapsulation, inheritance, polymorphism, the SOLID design principles, and design patterns

Course learning outcomes	<p>CLO 1. Explain and use concepts in object-oriented programming including classes, objects, abstraction, encapsulation, inheritance, and polymorphism.</p> <p>CLO 2. Implement an object-oriented solution in JAVA programming language.</p> <p>CLO 3. Analyze design principles and design patterns in object-oriented programming</p>																																																											
	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1</td></tr> <tr> <td>Skill</td><td>CLO2, CLO3</td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table> <p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Introduction to Java</td><td>3</td><td>I</td></tr> <tr> <td>Introduction to Object-Oriented Programming</td><td>3</td><td>I, T</td></tr> <tr> <td>Classes and Objects</td><td>3</td><td>T</td></tr> <tr> <td>Inheritance and composition</td><td>3</td><td>T</td></tr> <tr> <td>Polymorphism</td><td>3</td><td>T</td></tr> <tr> <td>Design with interfaces and abstract classes</td><td>3</td><td>T</td></tr> <tr> <td>Building Objects</td><td>3</td><td>T</td></tr> <tr> <td>Exception handling</td><td>3</td><td>T</td></tr> <tr> <td>Generic classes and methods</td><td>3</td><td>T</td></tr> <tr> <td>Introduction to SOLID principles</td><td>3</td><td>T, U</td></tr> <tr> <td>Single responsibility principle</td><td></td><td></td></tr> <tr> <td>Open/closed principle</td><td>1.5</td><td>T, U</td></tr> <tr> <td>Liskov substitution principle</td><td>1.5</td><td>T, U</td></tr> <tr> <td>Interface segregation principle</td><td>1.5</td><td>T, U</td></tr> <tr> <td>Dependency inversion principle</td><td>1.5</td><td>T, U</td></tr> <tr> <td>Reusing Designs Through Design Patterns</td><td>6</td><td>T, U</td></tr> </tbody> </table> <p>Examination forms</p> <p>Short-answer questions</p> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation.</p> <p>Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p> <p>Reading list</p> <ul style="list-style-type: none"> <li>1. Paul J. Deitel (Author), Harvey Deitel (Author), Java How To Program, 11th Edition, Prentice Hall, 2017 	Competency level	Course learning outcome (CLO)	Knowledge	CLO1	Skill	CLO2, CLO3	Attitude		Topic	Weight	Level	Introduction to Java	3	I	Introduction to Object-Oriented Programming	3	I, T	Classes and Objects	3	T	Inheritance and composition	3	T	Polymorphism	3	T	Design with interfaces and abstract classes	3	T	Building Objects	3	T	Exception handling	3	T	Generic classes and methods	3	T	Introduction to SOLID principles	3	T, U	Single responsibility principle			Open/closed principle	1.5	T, U	Liskov substitution principle	1.5	T, U	Interface segregation principle	1.5	T, U	Dependency inversion principle	1.5	T, U	Reusing Designs Through Design Patterns	6	T, U
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| | <p>2. Matt Weisfeld, The Object-Oriented Thought Process, 3rd Edition, Addison-Wesley, 2009</p> <p>3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley Professional, 1994</p> <p>4. Eric Freeman, Bert Bates, Kathy Sierra and Elisabeth Robson, Head First Design Patterns: A Brain-Friendly Guide, O'Reilly Media, 2004</p> |
|--|--|

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO	SLO				
CLO	1	2	3	4	5
1	XX				
2		XX		X	
3		XXX			X

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Java	1	Quiz	Lecture	[1]
2	Introduction to Object-Oriented Programming	1	Quiz	Lecture, Discussion	[1,2]
3	Classes and Objects	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
4	Inheritance and composition	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
5	Polymorphism	2	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
6	Design with interfaces and abstract classes	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
7	Building Objects	2,3	Quiz, Lab, Midterm	Lecture, Discussion, In-class exercises	[1,2]
8	Exception handling	1,2	Quiz	Lecture	[1]
9	Midterm				
10	Generic classes and methods	2,3	Quiz, Lab, Final	Lecture, Discussion, In-class exercises	[1,2]
11	Introduction to SOLID principles Single responsibility principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises	[1,3,4]
12	Open/closed principle	2,3	Quiz, Project, Final	Lecture, Discussion,	[1,3,4]

	Lisko substitution principle		In-class exercises	
13	Interface segregation principle Dependency inversion principle	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises
14	Reusing Designs Through Design Patterns, part 1	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises
15	Reusing Designs Through Design Patterns, part 2	2,3	Quiz, Project, Final	Lecture, Discussion, In-class exercises
16	Final exam			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz (5%)	10%		20%
Labs (10%)	30%	30%	
Midterm examination (30%)	50%	40%	
Projects/Presentations/ Report (15%)	10%		30%
Final examination (40%)		30%	50%

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports

Student:	HW/Assignment:	Evaluator:	Max.	Score	Comments
Technical content (60%)					
Abstract clearly identifies purpose and summarizes principal content	10				
Introduction demonstrates thorough knowledge of relevant background and prior work	15				
Analysis and discussion demonstrate good subject mastery	30				
Summary and conclusions appropriate and complete	5				
Organization (10%)					
Distinct introduction, body, conclusions	5				
Content clearly and logically organized, good transitions	5				
Presentation (20%)					
Correct spelling, grammar, and syntax	10				
Clear and easy to read	10				
Quality of Layout and Graphics (10%)					
			TOTAL SCORE	100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark		
			4	3	2
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without any interpretation/clarification or description.
Influence of context and assumptions	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as fact, without question.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Student's position (perspective, thesis/hypothesis)	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position..	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).
Conclusions and related outcomes (implications and consequences)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.
	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Algorithms and Data Structure

Course Code: IT013

1. General information

Course designation	This subject introduces students to basic data structures and algorithms
Semester(s) in which the course is taught	4,6
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Compulsory (All programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	Introduction to data structures and algorithms, including their design, analysis, and implementation.
Course learning outcomes	CLO 1. Understand basic data structures and algorithms CLO 2. Analyze and evaluate data structures and algorithms. CLO 3. Design algorithms and select data structures for real world applications.

	Competency level	Course learning outcome (CLO)
Knowledge		CLO1
Skill		CLO2, CLO3
Attitude		CLO3
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	
Topic	Weight	Level
Review OOP & Java	3	I
Arrays	3	T
Complexity	3	T
Sorting	3	T, U
Queue, Stack	3	T
List	6	T
Recursion	3	T, U
Advanced Sorting	6	T
Binary Tree	3	T
Hash Table	3	T
Graphs	3	T
Algorithms on graphs	3	T, U
Examination forms	Short-answer questions	
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>	
Reading list	<ol style="list-style-type: none"> Michael T. Goodrich and Roberto Tamassia, Data Structures and Algorithms in Java 6th, 2014 Cormen, Thomas H., et al. Introduction to algorithms. MIT press, 2009. Lafore, Robert. Data structures and algorithms in Java. Sams publishing, 2017. 	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO				
CLO 1	1	2	3	4	5
1	XX				6

2		XXX			X
3					

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Review OOP & Java	1	Quiz	Lecture	
2	Arrays	1	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
3	Complexity	2	Quiz	Lecture, Discussion	[2]
4	Sorting	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
5	Queue, Stack	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
6	List part 1	1,2	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
7	List part 2	2,3	Lab, Quiz, Midterm	Lecture, Discussion	
8	Recursion	2,3	Lab, Quiz, Midterm	Lecture, Discussion, In class exercises	[1,3]
9	Midterm				
10	Advanced Sorting part 1	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
11	Advanced Sorting part 2	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,2,3]
12	Binary Tree	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[1,3]
13	Hash Table	2,3	Lab, Quiz, Final	Lecture, Discussion	[1,3]
14	Graphs	1,2	Lab, Quiz, Final	Lecture, Discussion, In class exercises	[2,3]
15	Algorithms on graphs	2,3	Lab, Quiz, Final	Lecture, Discussion	[2,3]
16	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Quiz (5%)	20%	5%	
Labs (10%)		10%	
Midterm examination (30%)	40%	30%	30%
Projects/Presentations/ Report (15%)		15%	40%
Final examination (40%)	40%	40%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	Date:	HW/Assignment:	Evaluator:
		Max.	Score
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone	Milestone	Benchmark
			1
	4	3	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or omissions.
		2	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.
		1	Issue/ problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is partially observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	and speaker appears polished and confident.	and speaker appears comfortable.	understandable, and speaker appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Principles of Database Management

Course Code: IT079

1. General information

Course designation	This course focuses on the design and implementation of database management systems
Semester(s) in which the course is taught	4
Person responsible for the course	Assoc. Prof. Dr. Nguyen Thi Thuy Loan
Language	English
Relation to curriculum	Compulsory (NE, CS,DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	IT116IU (C Programming)
Course objectives	This subject introduces the students to basic database design and implementation concepts. Database design techniques, including relational design and E-R analysis, are presented. Database queries using SQL are covered in lectures and supported by practical exercises.
Course learning outcomes	CLO 1. Produce an (Extended) Entity-Relationship (E-R) model from specifications. CLO 2. Apply data normalization principles to transforming an ER model into a database schema.

	CLO 3. Construct efficient SQL queries to retrieve and manipulate data as required.																											
	<table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO1</td> </tr> <tr> <td>Skill</td> <td>CLO2, CLO3</td> </tr> <tr> <td>Attitude</td> <td>CLO3</td> </tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1	Skill	CLO2, CLO3	Attitude	CLO3																			
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Examination forms	Multiple-choice questions, short-answer questions																											
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>																											
Reading list	<ol style="list-style-type: none"> 1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concept 7th, 2020 2. Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, Modern Database Management 13th, 2019 3. Ramez Elmasri, Shamkant Navathe, Fundamentals of Database Systems 7th, 2016 																											

2. Learning Outcomes Matrix (optional)

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO 1	2	3	4	5	6	
1	XXXX					
2		XXX		X		
3		XX			XX	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Database Systems	1	Quiz	Lecture	[1,3]
2	Relational Model and relational Algebra	2	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,3]
3	Structured Query Language	3	Quiz, Lab, Project, Midterm	Lecture, Discussion, In-class, exercise	[1,2,3]
4	(Extended) Entity Relationship Model	2	Quiz, Project, Midterm	Lecture, Discussion, In-class, exercise	[1,2,3]
5	Midterm				
6	Relational Database Design	2,3	Project, Final, Quiz, Lab	Lecture, Discussion, In-class, exercise	[1,2]
7	Normalization	2,3	Quiz, Project, Final	Lecture, Discussion, In-class, exercise	[2,3]
8	Advanced SQL	3	Quiz, Project, Final	Lecture, Discussion, In-class, exercise	[1,3]
9	Review	2,3	Quiz	Discussion, In-class, exercise	[1,2,3]
10	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Labs (10%)		10%	20%
Midterm examination (25%)	40%		20%
Quiz (5%)	10%	20%	
Projects/Presentations/ Report (20%)	30%	20%	30%
Final examination (40%)	20%	50%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

-
- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↪

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Evaluator:	Comments
Technical content (60%)		Max.	Score
Abstract clearly identifies purpose and summarizes principal content		10	

Introduction demonstrates thorough knowledge of relevant background and prior work	15
Analysis and discussion demonstrate good subject mastery	30
Summary and conclusions appropriate and complete	5
Organization (10%)	
Distinct introduction, body, conclusions	5
Content clearly and logically organized, good transitions	5
Presentation (20%)	
Correct spelling, grammar, and syntax	10
Clear and easy to read	10
Quality of Layout and Graphics (10%)	
TOTAL SCORE	100

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Capstone	Milestone	Benchmark	
	4	3	2	1
Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.

	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Supporting Material	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Computer Architecture

Course Code: IT089

1. General information

Course designation	This course introduces the principles of computer organization and the basic computer architecture.
Semester(s) in which the course is taught	4
Person responsible for the course	Dr. Le Hai Duong
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120 Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Digital Logic Design
Course objectives	This course provides students the principles of computer architecture and organization. It covers the subjects on assembly language and machine code, computer arithmetic and ALU design, computer performance, datapath and control, pipelining, memory hierarchy, I/O devices, multi-processor architectures, and mobile and multi-core processors.

Course learning outcomes	<p>CLO 1. Understand the principles of computer architecture and the interfaces between its hardware and software components;</p> <p>CLO 2. Understand computer arithmetic (both integer and floating point), datapath, control , pipelining, pipeline hazards and their remedies, computer buses and I/O peripherals, and multiprocessor architecture;</p> <p>CLO 3. Create assembly programs and their machine code equivalent;</p> <p>CLO 4. Analyze the performance of computer;</p> <p>CLO 5. Analyze computer memory and its organization, especially the interaction between cache and main memory.</p> <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1, CLO2</td></tr> <tr> <td>Skill</td><td>CLO3, CLO4, CLO5</td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table> <p>Content</p> <p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>History of computers, relations of software and hardware components;</td><td>1</td><td>I</td></tr> <tr> <td>Assembly language instructions</td><td>5</td><td>T, U</td></tr> <tr> <td>Computer arithmetic principles and hardware design</td><td>1</td><td>T</td></tr> <tr> <td>Computer performance</td><td>1</td><td>T,U</td></tr> <tr> <td>Datapath and its control</td><td>2</td><td>T</td></tr> <tr> <td>Multiprocessor pipelining</td><td>2</td><td>T, U</td></tr> <tr> <td>Memory hierarchy</td><td>1</td><td>T</td></tr> <tr> <td>I/O devices and buses</td><td>1</td><td>T</td></tr> <tr> <td>Multiprocessor</td><td>1</td><td>T</td></tr> <tr> <td>Examination forms</td><td>Multiple-choice questions, short-answer questions</td><td></td></tr> <tr> <td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</td><td></td></tr> <tr> <td>Assignments/Examination:</td><td>Students must have more than 50/100 points overall to pass this course.</td><td></td></tr> <tr> <td>Reading list</td><td>1. David A. Patterson and John L. Hennessy, Computer Organization and Design 5th, 2013</td><td></td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1, CLO2	Skill	CLO3, CLO4, CLO5	Attitude		Topic	Weight	Level	History of computers, relations of software and hardware components;	1	I	Assembly language instructions	5	T, U	Computer arithmetic principles and hardware design	1	T	Computer performance	1	T,U	Datapath and its control	2	T	Multiprocessor pipelining	2	T, U	Memory hierarchy	1	T	I/O devices and buses	1	T	Multiprocessor	1	T	Examination forms	Multiple-choice questions, short-answer questions		Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.		Assignments/Examination:	Students must have more than 50/100 points overall to pass this course.		Reading list	1. David A. Patterson and John L. Hennessy, Computer Organization and Design 5th, 2013	
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2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO	CLO 1	CLO 2	CLO 3	CLO 4	CLO 5	CLO 6
Week	Topic						
1	X						
2	X						
3		X					X
4	X						
5	X						

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	History of computers, relations of software and hardware components;	1	Quiz, exam	Lecture [1]	
2	Assembly language instructions	3	Quiz, exam	Lecture, lab, exercises [1]	
3	Computer arithmetic principles and hardware design	2	Quiz, exam	Lecture, exercises [1]	
4	Midterm				
5	Computer performance	4	Quiz, exam	Lecture, exercises [1]	
6	Datapath and its control	1, 2	Quiz, exam	Lecture, exercises [1]	
7	Microprocessor pipelining		Quiz, exam	Lecture, exercises [1]	
8	Memory hierarchy	5	Quiz, exam	Lecture, exercises [1]	
9	I/O devices and buses	2	Quiz, exam	Lecture, exercises [1]	
10	Multiprocessor	2	Quiz, exam	Lecture, exercises [1]	
11	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Midterm examination (30%)	70%	70%	25%		
Final examination (40%)			50%	70%	70%
Exercises/ Quiz (30%)	30%	30%	25%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

-
- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↵

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	Date:	HW/Assignment:	Evaluator:
		Max.	Score
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone	Milestone		Benchmark
		4	3	
Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is partially observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	and speaker appears polished and confident.	and speaker appears comfortable.	understandable, and speaker appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Object-oriented analysis and design

Course Code: IT090

1. General information

1. Course designation	This course helps students learn about system life cycle development and the knowledge and skills required to develop object-oriented system.	
Semester(s) in which the course is taught	4	
Person responsible for the course	MSc. Dao Tran Hoang Chau	
Language	English	
Relation to curriculum	Compulsory (CS)	
Teaching methods	Lecture, lesson, project, seminar.	
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 hours. Contact hours: Lecture 45 hours, Lab 30 hours. Private hours: 120 hours. Student responsibility: Students are expected to spend at least 8 hours per week for self-studying. This time should be made up of reading, working on exercises and problems and group assignment.	
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1	
Required and recommended prerequisites for joining the course	Object-Oriented Programming	
Course objectives	The course tries to solve the following questions • What are design approaches other than object-oriented design? What is object-oriented design? • What is a good design? How do you differentiate between a good and a bad design? What are the important characteristics of a good design?	
Course learning outcomes	CLO 1. Identify client needs based on a written or verbal specification; CLO 2. Know how analyze and design a system with object-oriented concepts and design patterns; CLO 3. Know how to work in team effectively;	
	Competency level	Course learning outcome (CLO)

	Knowledge	1, 2																			
	Skill	1, 3																			
	Attitude	3																			
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (45 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>																				
	<table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Software development life cycle;</td><td>2</td><td>T</td></tr> <tr> <td>Requirements gathering techniques;</td><td>1</td><td>T</td></tr> <tr> <td>Analyze client's requirements;</td><td>4</td><td>T</td></tr> <tr> <td>Design and implementation the system;</td><td>6</td><td>T, U</td></tr> <tr> <td>Design patterns;</td><td>2</td><td>T, U</td></tr> </tbody> </table>			Topic	Weight	Level	Software development life cycle;	2	T	Requirements gathering techniques;	1	T	Analyze client's requirements;	4	T	Design and implementation the system;	6	T, U	Design patterns;	2	T, U
Topic	Weight	Level																			
Software development life cycle;	2	T																			
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Design and implementation the system;	6	T, U																			
Design patterns;	2	T, U																			
Examination forms	Multiple-choice questions, short-answer questions																				
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>																				
Reading list	<ol style="list-style-type: none"> 1. Craig Larman, Applying UML and Patterns - An introduction to Object-Oriented Analysis And Design 3rd, 2004 																				

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

SLO						
CLO	1	2	3	4	5	6
1	x					
2		x				
3					x	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Software development life cycle;	1	Midterm exam	Lecture, In-class activities	
2	Requirements gathering techniques;	1	Midterm exam	Lecture, In-class activities	
3	Analyze client's requirements;	1,3	Midterm exam, Assignment, Lab quiz	Lecture, In-class activities, Quiz	
4	Midterm				

5	Design and implementation the system;	2, 3	Final exam, Assignment, Lab quiz	Lecture, In-class activities, Quiz
6	Design patterns;	2	Final exam	Lecture, In-class activities
7	Final exam			

4. Assessment plan

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (25%)	40%	25%	
Projects/Presentations/ Report (25%)	60%	30%	70%
Final examination (40%)		30%	10%
Exercises/ Quiz (10%)		15%	20%

-
- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.
[↳](#)

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
Technical content (60%)		Max.	Score
Abstract clearly identifies purpose and summarizes principal content		10	
Introduction demonstrates thorough knowledge of relevant background and prior work		15	
Analysis and discussion demonstrate good subject mastery		30	
Summary and conclusions appropriate and complete		5	
Organization (10%)		Max.	Score
Distinct introduction, body, conclusions		5	
Content clearly and logically organized, good transitions		5	
Presentation (20%)		Max.	Score
Correct spelling, grammar, and syntax		10	
Clear and easy to read		10	
Quality of Layout and Graphics (10%)		Max.	Score
		10	

		TOTAL SCORE	100		
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5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark	
		4	3	2	1
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated, described, and undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or descriptions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or descriptions.	Information is taken from source(s) without any interpretation/evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with enough interpretation/evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.
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Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone		Benchmark	
		4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	Central message is deduced but is not explicitly stated in the presentation.

Date revised: February 15, 2022

Source: Association of American Colleges and Universities

Ho Chi Minh City, 15/02/2022

Dean of School of Computer Science and Engineering



Assoc.Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Computer Networks

Course Code: IT091

1. General information

Course designation	This subject covers the fundamental knowledge of computer networks
Semester(s) in which the course is taught	3,5
Person responsible for the course	Assoc. Prof. Vo Thi Luu Phuong.
Language	English
Relation to curriculum	Compulsory (CS, NE, CE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	This course covers the fundamental knowledge of computer networks such as OSI, TCP/IP models, network architectures, LAN, WAN, the typical network protocols. The students will also study to design, implement and monitor a small / medium scale network.
Course learning outcomes	CLO 1. Analyze the components, architecture, and protocols in computer networks; CLO 2. Apply the theory in designing a small/medium computer networks; CLO 3. Show the ability to work in teams;

		Competency level	Course learning outcome (CLO)
	Knowledge	CLO1	
	Skill	CLO2, CLO3	
	Attitude	CLO2	
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>		
Topic	Weight	Level	
Introduction of computer networks	2	T, U	
Network applications: HTTP, FTP, DNS, SMTP	2	T, U	
Transport layer: congestion control, TCP, UDP	2	T, U	
IP addressing, CIDR, VLSM	2	T, U	
Network layer: routing algorithms, routing protocols	2	T, U	
Datalink layer and physical layer	2	T, U	
Wireless and mobile networks	2	T	
Some advanced topics in contemporary networks	1	U	
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation.</p> <p>Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		
Reading list	<ol style="list-style-type: none"> 1. J. F. Kurose and K. W. Ross, Computer Networking: A Top Down Approach 7th, 2014 		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-3) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	✓✓					
2		✓✓✓				
3					✓	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1-2	Introduction of computer networks	1	Midterm	lecture	Chapter 1, [1]
3-4	Network applications: HTTP, FTP, DNS, SMTP	1	Midterm, Lab	lecture, lab	Chapter 2, [1]

5-6	Transport layer: congestion control, TCP, UDP	1	Midterm, Lab	lecture, lab	Chapter 3, [1]
	Midterm				
7-8	IP addressing, CIDR, VLSM	2	Final, Lab	lecture, lab	Chapter 4, [1]
9-10	Network layer: routing algorithms, routing protocols	1,2	Final, Lab	lecture, lab	Chapter 5, [1]
11-12	Datalink layer and physical layer	1,2	Final, Lab	lecture, lab	Chapter 6, [1]
13-14	Wireless and mobile networks	1	Final	lecture	Chapter 7, [1]
15	Some advanced topics in contemporary networks	3	Group project	group work	Literature
10	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Exercises, quizzes, attendants (10%)	30%	30%	30%
Group project (5%)		30%	40%
Labs (25%)		30%	30%
Midterm examination (30%)	40%		
Final examination (30%)	30%	40%	

1. When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↵

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports				
Student:	HW/Assignment:	Date:	Evaluator:	
Technical content (60%)		Max.	Score	Comments
Abstract clearly identifies purpose and summarizes principal content	10			
Introduction demonstrates thorough knowledge of relevant background and prior work	15			
Analysis and discussion demonstrate good subject mastery	30			
Summary and conclusions appropriate and complete	5			
Organization (10%)				
Distinct introduction, body, conclusions	5			
Content clearly and logically organized, good transitions	5			

Presentation (20%)	
Correct spelling, grammar, and syntax	10
Clear and easy to read	10
Quality of Layout and Graphics (10%)	10
TOTAL SCORE	100

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	2
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or descriptions.
Influence of context and assumptions	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.
	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
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Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
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Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

A handwritten signature in blue ink, appearing to read "Nguyen Van Sinh".

Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Artificial Intelligence

Course Code: IT159

1. General information

Course designation	This subject introduces the students to the principles and fundamental algorithms of Artificial Intelligence, the use cases and the related processes in Artificial Intelligence.
Semester(s) in which the course is taught	6,8
Person responsible for the course	Dr. Nguyen Trung Ky
Language	English
Relation to curriculum	Elective
Teaching methods	Lecture, lesson, project, laboratory.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 hours (lectures) + 30 hours (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Algorithms and Data Structures Discrete Mathematics Probability, Statistic & Random Process
Course objectives	This course introduces students to the basic knowledge on Artificial Intelligence. Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviors on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously. In this course, student will learn the foundational principles and practice implementing some of these applications including

		representation, problem solving, and learning methods of artificial intelligence. Accordingly, students should be able to develop intelligent systems by assembling solutions to concrete computational problems; understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering; and appreciate the role of problem solving, vision, and language in understanding human intelligence from a computational perspective.								
Course learning outcomes	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO 1. Apply knowledge of AI techniques and synthesize solutions to the discipline and ability to develop a range of typical applications using artificial intelligence methods CLO 2. Represent knowledge corresponding to practical problems, design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs by properly using classical search algorithms, including breadth-first, depth-first, A*, and heuristic search</td></tr> <tr> <td>Skill</td><td>CLO 3. Produce intelligent applications of machine learning with statistical learning methods (Naive Bayes), supervised and unsupervised learning models: decision tree, neural networks, single-layer (perceptron) and multilayer networks CLO 4. Communicate effectively with a range of audiences, ability to use current techniques, skills, and tools necessary for computing practice, ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices and ability to apply design and development principles in the construction of software systems of varying complexity</td></tr> <tr> <td>Attitude</td><td></td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO 1. Apply knowledge of AI techniques and synthesize solutions to the discipline and ability to develop a range of typical applications using artificial intelligence methods CLO 2. Represent knowledge corresponding to practical problems, design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs by properly using classical search algorithms, including breadth-first, depth-first, A*, and heuristic search	Skill	CLO 3. Produce intelligent applications of machine learning with statistical learning methods (Naive Bayes), supervised and unsupervised learning models: decision tree, neural networks, single-layer (perceptron) and multilayer networks CLO 4. Communicate effectively with a range of audiences, ability to use current techniques, skills, and tools necessary for computing practice, ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices and ability to apply design and development principles in the construction of software systems of varying complexity	Attitude		
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Skill	CLO 3. Produce intelligent applications of machine learning with statistical learning methods (Naive Bayes), supervised and unsupervised learning models: decision tree, neural networks, single-layer (perceptron) and multilayer networks CLO 4. Communicate effectively with a range of audiences, ability to use current techniques, skills, and tools necessary for computing practice, ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices and ability to apply design and development principles in the construction of software systems of varying complexity									
Attitude										
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p>									

	Teaching levels: I (Introduce); T (Teach); U (Utilize)			
Topic		Weight	Level	
Introduction and Intelligent Agents		1	I	
States and Searching: Uninformed Search		1	T, U	
States and Searching: Informed and More Sophisticated Search		1	T, U	
Features and Constraints: Constraint Satisfaction Problems		1	T, U	
Features and Constraints: Constraint Satisfaction Problems (continue)		1	T, U	
Reasoning Under Uncertainty:		1	T, U	
▪ Random Variables and Events				
▪ Joint and Marginal Distributions				
▪ Conditional Distribution				
▪ Product Rule, Chain Rule, Bayes' Rule				
▪ Inference				
Reasoning Under Uncertainty: Naïve Bayes Classifier (continue)		1	T, U	
Supervised Learning: Neural Networks		1	T, U	
Supervised Learning: Neural Networks (continue)		1	T, U	
Supervised Learning: Support Vector Machine		1	T, U	
Supervised Learning: Support Vector Machine in Mathematics		1	T, U	
Beyond Supervised Learning: Kernels and Clustering		1	T, U	
Beyond Supervised Learning: Kernels and Clustering (continue)		1	T, U	
Gaussian Mixture Model and Expectation-Maximization Algorithm		1	T, U	
Revision		1		
Examination forms	Multiple-choice questions, short-answer questions			
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.			
	Assignments/Examination: Students must have more than 50/100 points overall to pass this course.			
Reading list	[1] Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", Fourth Edition, 2020. [2] David L. Poole and Alan K. Mackworth, "Artificial Intelligence Foundations of Computational Agents", Second Edition, 2017.			

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x	x				
2		x			x	
3		x			x	
4	x	x			x	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction and Intelligent Agents	1, 2	Quiz	Lecture, Discussion	[1]. Chapter 1, 2 [2]. Chapter 1
2	States and Searching: Graph Searching Techniques	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 3
3	States and Searching: Heuristic Search and More Sophisticated Search	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 3
4	Features and Constraints: Constraint Satisfaction Problems	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 6
5	Features and Constraints: Constraint Satisfaction Problems (continue)	1, 2	Quiz	Lecture, In-class quiz	[1]. Chapter 6
6	Reasoning Under Uncertainty	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 12
7	Reasoning Under Uncertainty (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 12
8	Midterm				
9	Supervised Learning: Neural Networks	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 20
10	Supervised Learning: Neural Networks (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 20
11	Supervised Learning: Support Vector Machine	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 15
12	Supervised Learning: Support Vector Machine in Mathematics (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 19 [2]. Chapter 15
13	Beyond Supervised Learning: Kernels and Clustering	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 21 [2]. Chapter 16, 22
14	Beyond Supervised Learning: Kernels and Clustering (continue)	3, 4	Quiz	Lecture, In-class quiz	[1]. Chapter 21 [2]. Chapter 16, 22

15	Gaussian Mixture Model and Expectation-Maximization Algorithm	3, 4	Quiz	Lecture, Discussion	[1]. Chapter 20 [2]. Chapter 24
16	Revision			Review-test	
17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Labs (20%)	50%	50%	
Midterm examination (30%)	50%	50%	
Final examination (40%)	100%		
Exercises/ Quiz (10%)	50%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

-
- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↪

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
Technical content (60%)	Max.	Score	Comments
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)			
TOTAL SCORE	100		

5.2. Holistic rubric

Score	Description
	Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	2
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.
Influence of context and assumptions	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.
Student's position (perspective, thesis/hypothesis)	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position. Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).
Conclusions and related outcomes (implications and consequences)	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.
	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Principles of Programming Languages

Course Code: IT092

1. General information

Course designation	This course provides students the important principles of programming languages.
Semester(s) in which the course is taught	6
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Compulsory (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	This course helps students: Learn important principles of programming languages; Learn basic components of programming languages; Learn programming language paradigms; Improve programming and software engineering skills
Course objectives	This course helps students: Learn important principles of programming languages; Learn basic components of programming languages; Learn programming language paradigms; Improve programming and software engineering skills
Course learning outcomes	CLO 1. Understand a wide range of programming paradigms CLO 2. Understand how different programming languages evolved CLO 3. Understand the differences in problem domains and language suitability CLO 4. Understand the basic features of programming language translation CLO 5. Understand implementation techniques for selected language constructs

		Competency level	Course learning outcome (CLO)																																							
Knowledge		1,2,3,4,5																																								
Skill		2																																								
Attitude																																										
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (# hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	<table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Preliminaries</td><td>3</td><td>I,T</td></tr> <tr> <td>Evolution of the Major Programming Languages</td><td>6</td><td>I,T</td></tr> <tr> <td>Functional Programming Languages</td><td>6</td><td>I,T</td></tr> <tr> <td>Software processes Describing Syntax and Semantics</td><td>3</td><td>I,T</td></tr> <tr> <td>Lexical and Syntax Analytics</td><td>3</td><td>I,T</td></tr> <tr> <td>Names, Bindings, Type Checking, and Scopes</td><td>3</td><td>I,T</td></tr> <tr> <td>Data Types</td><td>3</td><td>I,T</td></tr> <tr> <td>Expressions and Assignment Statement</td><td>3</td><td>I,T</td></tr> <tr> <td>Logic Programming Languages</td><td>6</td><td>I,T</td></tr> <tr> <td>Statement-Level Control Structures</td><td>3</td><td>I,T</td></tr> <tr> <td>Subprograms</td><td>3</td><td>I,T</td></tr> <tr> <td>Implement Subprograms</td><td>3</td><td>I,T</td></tr> </tbody> </table>	Topic	Weight	Level	Preliminaries	3	I,T	Evolution of the Major Programming Languages	6	I,T	Functional Programming Languages	6	I,T	Software processes Describing Syntax and Semantics	3	I,T	Lexical and Syntax Analytics	3	I,T	Names, Bindings, Type Checking, and Scopes	3	I,T	Data Types	3	I,T	Expressions and Assignment Statement	3	I,T	Logic Programming Languages	6	I,T	Statement-Level Control Structures	3	I,T	Subprograms	3	I,T	Implement Subprograms	3	I,T	<p>Multiple-choice questions, short-answer questions</p> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>
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Reading list	<ol style="list-style-type: none"> 1. Robert W. Sebesta, Concepts of programming languages 10th, 2012 2. Terrence W.Pratt and Marvin V. Zelkowitz, Programming Languages - Design and Implementation 4th, 2011 																																									

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-5) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x					
2		x				
3	x					
4	x					
5	x					

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Preliminaries	1	Quiz,	lecture, exercises	
2	Evolution of the Major Programming Languages	2,3	Quiz,	lecture, exercises	
3	Functional Programming Languages	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
4	Software processes Describing Syntax and Semantics	3,4,5	Quiz, Exam	lecture, exercises	
5	Lexical and Syntax Analytics	4,5	Quiz, Exam	lecture, exercises	
6	Midterm				
7	Names, Bindings, Type Checking, and Scopes	4,5	Quiz, Exam	lecture, exercises	
8	Data Types	4,5	Quiz, Exam	lecture, exercises	
9	Expressions and Assignment Statement	4,5	Quiz, Exam	lecture, exercises	
10	Logic Programming Languages	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
11	Statement-Level Control Structures	4,5	Quiz, Exam	lecture, exercises	
12	Subprograms	4,5	Quiz, Exam	lecture, exercises	
13	Implement Subprograms	4,5	Quiz, Exam	lecture, exercises	
14	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5
Midterm examination (30%)	50%	50%	50%	50%	50%
Final examination (40%)				50%	50%
Exercises/ Quiz (10%)	20%	20%	20%	20%	20%
Lab. Assignments (20%)	30%	30%	30%	30%	30%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	Date:	HW/Assignment:	Evaluator:
		Max.	Score
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone	Milestone	Benchmark
			1
	4	3	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or omissions.
		2	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.
		1	Issue/ problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is partially observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	and speaker appears polished and confident.	and speaker appears comfortable.	understandable, and speaker appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Operating Systems

Course Code: IT017

1. General information

Course designation	This course covers fundamental concepts of operating systems including scheduling, virtual memory and file systems.
Semester(s) in which the course is taught	5,7
Person responsible for the course	Dr. Le Hai Duong
Language	English
Relation to curriculum	Compulsory (NE, CE, CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120 Student responsibility: Students are expected to spend at least 8 hours per week for self – studying. This time should be made up of reading, working on exercises and problems and group assignment.
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Algorithms and Data Structure Computer Architecture
Course objectives	This course presents the theory, design, implementation, and analysis of computer operating systems. Through classroom lectures, labs, projects and exercises, students learn the fundamentals of concurrency and process management, inter-process communication and synchronization, memory management, job scheduling algorithms, input/output management, file

	systems, security in operating systems. Course labs use the C/C++ language and include the design and implementation of portions of an operating system.																																					
Course learning outcomes	CLO 1. Understand processes and process management CLO 2. Understand synchronization and communication CLO 3. Understand memory management CLO 4. Given a scheduling algorithm, determine timeline of actions CLO 5. Understand internals of file system CLO 6. Design and implement portions of an operating system																																					
	<table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO1, CLO2, CLO3, CLO4, CLO5</td> </tr> <tr> <td>Skill</td> <td>CLO6</td> </tr> <tr> <td>Attitude</td> <td></td> </tr> </tbody> </table>						Competency level	Course learning outcome (CLO)	Knowledge	CLO1, CLO2, CLO3, CLO4, CLO5	Skill	CLO6	Attitude																									
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2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-6) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	X					
2	X					
3	X					
4		X				
5	X					
6		X				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction, processes, process management	1	Quiz, exam	Lecture, exercises, lab	[1], [2]
2	Threads	1	Quiz, exam	Lecture, exercises, lab	[1], [2]
3	Inter-process communication (IPC) and synchronization, deadlocks	2	Quiz, exam	Lecture, exercises, lab	[1], [2]
4	Memory management	3	Quiz, exam	Lecture, exercises, lab	[1], [2]
5	Midterm				
6	process scheduling	4	Quiz, exam	Lecture, exercises, lab	[1], [2]
7	Input/output and disk management	5	Quiz, exam	Lecture, exercises, lab	[1], [2]
8	File systems	5	Quiz, exam	Lecture, exercises, lab	[1], [2]
9	Security in operating systems	6	Quiz, exam	Lecture, exercises, lab	[1], [2]
10	Embedded operating systems	6	Quiz, exam	Lecture, exercises, lab	[1], [2]
11	Distributed system issues	6	Quiz, exam	Lecture, exercises, lab	[1], [2]
12	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4	CLO5	CLO6
Midterm examination (30%)	10%	10%				
Projects/Presentations/ Report (20%)	3%	3%		4%		10%
Final examination (40%)			18%	17%	15%	
Exercises/ Quiz (10%)	2%	2%	2%	2%	2%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↵

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)			
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	1

		Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or descriptions.
Explanation of issues				
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>		Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions		Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).
Student's position (perspective, thesis/hypothesis)		Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.
Conclusions and related outcomes (implications and consequences)		Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	4	3	Milestone	2	Benchmark	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Web Application Development

Course Code: IT093

1. General information

Course designation	This subject introduces to students the development of web application. How to design and program a web-app in practice based on the tools, techniques and web frameworks
Semester(s) in which the course is taught	6
Person responsible for the course	Assoc. Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	Compulsory (NE, CE, CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Principles of Database Management
Course objectives	This course provides students the fundamentals of web design and web programming. It provide the concepts and models of HTML, Java Server Page, Java Bean, MVC model, Java utilities and development environments, extended Java frameworks, several new frameworks with different programming languages. To develop skills in understanding and evaluating web-based systems, as well as to develop skills in designing and developing web-based applications.

<p>Course learning outcomes</p> <p>CLO 1. Understand web design, web programming concepts and models. CLO 2. Apply to design and develop static/dynamic web application with HTML, Java Server Pages, Java Bean, extended Java and other frameworks based on the MVC model. CLO 3. Apply knowledge and ability to manage and use Java, XML utilities and IDE for developing web applications with DBMS. CLO 4: work in group, communication, interaction and responsible within a team.</p>	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1</td></tr> <tr> <td>Skill</td><td>CLO2, CLO3</td></tr> <tr> <td>Attitude</td><td>CLO4</td></tr> </tbody> </table> <p>Content</p> <p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 teaching hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Week 1: Introduction to the course and HTML</td><td>3</td><td>I,T</td></tr> <tr> <td>Week 2: Advanced HTML and CSS</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 3: Introduction to J2EE and new frameworks in web application</td><td>3</td><td>I,T</td></tr> <tr> <td>Week 4 : Servlet</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 5: Java server page and JDBC</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 6: Java Bean and MVC</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 7: Web state, session, cookies & midterm review</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 8: Java Script, APIs and Libraries</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 9&10: Node JS Framework</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 11: Graphical models on the webpage, web multimedia and web 360</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 12&13: XML & XSLT</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 14: Ajax framework</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Week 15: the existing web frameworks & final review</td><td>3</td><td>I,T,U</td></tr> <tr> <td>Examination forms</td><td colspan="2">Multiple-choice questions, short-answer questions and programming</td></tr> <tr> <td>Study and examination requirements</td><td colspan="2"> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p> </td></tr> <tr> <td>Reading list</td><td colspan="2"> <ol style="list-style-type: none"> Dave Wolf and A.J. Henley. ‘Java EE Web Application Primer Building Bullhorn: A Messaging App with JSP, Servlets, JavaScript, Bootstrap and Oracle’, 2017. </td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1	Skill	CLO2, CLO3	Attitude	CLO4	Topic	Weight	Level	Week 1: Introduction to the course and HTML	3	I,T	Week 2: Advanced HTML and CSS	3	I,T,U	Week 3: Introduction to J2EE and new frameworks in web application	3	I,T	Week 4 : Servlet	3	I,T,U	Week 5: Java server page and JDBC	3	I,T,U	Week 6: Java Bean and MVC	3	I,T,U	Week 7: Web state, session, cookies & midterm review	3	I,T,U	Week 8: Java Script, APIs and Libraries	3	I,T,U	Week 9&10: Node JS Framework	3	I,T,U	Week 11: Graphical models on the webpage, web multimedia and web 360	3	I,T,U	Week 12&13: XML & XSLT	3	I,T,U	Week 14: Ajax framework	3	I,T,U	Week 15: the existing web frameworks & final review	3	I,T,U	Examination forms	Multiple-choice questions, short-answer questions and programming		Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		Reading list	<ol style="list-style-type: none"> Dave Wolf and A.J. Henley. ‘Java EE Web Application Primer Building Bullhorn: A Messaging App with JSP, Servlets, JavaScript, Bootstrap and Oracle’, 2017. 	
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|--|--|

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO	SLO				
CLO	1	2	3	4	5
1	X	X			
2		X			
3			X		X
4					X

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to the course and HTML	1	Quiz	Lecture,	[1,2]
2	Advanced HTML and CSS	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3]
3	Introduction to J2EE and new frameworks in web application	1	Quiz, Midterm	Lecture, Discussion	[1,2]
4	Servlet	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
5	Java server page and JDBC	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
6	Java Bean and MVC	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
7	Web state, session, cookies & midterm review	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
8	Java Script, APIs and Libraries & midterm review	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1,2,3,4]
9	Node JS Framework	2,3	Quiz, Lab	Lecture,	[1,2,3,4]

10	Node JS Framework (continue)	2,3	Quiz, Lab	Discussion, In-class exercises
11	Graphical models on the webpage, web multimedia and web 360	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises
12	XML & XSLT	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises
13	XML & XSLT (continue)	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises
14	Ajax framework	2,3	Quiz, Lab	Lecture, Discussion, In-class exercises
15	Existing web frameworks & final review	2,3	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises
16	Final exam			

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Labs (20%)		30%	40%	30%
Midterm examination (30%)	40\$	60%		
Exercises/Quiz (10%)	30%	40%	30%	
Final examination (40%)		50%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Evaluator:	
		Max.	Score
Technical content (60%)			Comments
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			

Distinct introduction, body, conclusions	5	
Content clearly and logically organized, good transitions	5	
Presentation (20%)		
Correct spelling, grammar, and syntax	10	
Clear and easy to read	10	
Quality of Layout and Graphics (10%)	10	
TOTAL SCORE	100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Capstone	Milestone			Benchmark 1
		4	3	2	
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or descriptions.	Information is taken from source(s) with some interpretation/evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.
Influence of context and assumptions	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understanding of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Software Engineering

Course Code: IT076

1. General information

Course designation	This course focuses on the design of software by implementing significant projects in teams
Semester(s) in which the course is taught	5, 7
Person responsible for the course	Assoc. Prof. Dr. Nguyen Thi Thuy Loan
Language	English
Relation to curriculum	Compulsory (CS, CE) Elective (NE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	IT069IU (Object-Oriented Programming)
Course objectives	This course provides students the fundamentals of software engineering concepts, methodologies, and processes. It covers the subjects on software process models, agile development methodologies, requirements engineering and analysis models, software design and implementation methods, test strategies, and software evolution. Students apply contemporary agile requirements analysis, planning, architecture, design, implementation and testing practices to software engineering project work in small teams.
Course learning outcomes	CLO 1. Describe the implement of software development process. CLO 2. Apply the principles and methods of software engineering in practice. CLO3. Practice teamwork skills in a software engineering project.

		Competency level	Course learning outcome (CLO)																															
Knowledge		CLO1																																
Skill		CLO2, CLO3																																
Attitude		CLO3																																
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Software development in practice</td><td>3</td><td>I</td></tr> <tr> <td>Beginning a project</td><td>3</td><td>T, U</td></tr> <tr> <td>Requirements</td><td>7.5</td><td>T, U</td></tr> <tr> <td>The user experience</td><td>4.5</td><td>T, U</td></tr> <tr> <td>System design</td><td>6</td><td>T, U</td></tr> <tr> <td>Program development</td><td>7.5</td><td>T, U</td></tr> <tr> <td>Reliability and testing</td><td>6</td><td>T, U</td></tr> <tr> <td>The business of software development</td><td>4.5</td><td>T, U</td></tr> <tr> <td>Review</td><td>3</td><td>I, U</td></tr> </tbody> </table> <p>Examination forms</p> <p>Multiple-choice questions, short-answer questions</p> <p>Study and examination requirements</p> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>				Topic	Weight	Level	Software development in practice	3	I	Beginning a project	3	T, U	Requirements	7.5	T, U	The user experience	4.5	T, U	System design	6	T, U	Program development	7.5	T, U	Reliability and testing	6	T, U	The business of software development	4.5	T, U	Review	3	I, U
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Reading list	<ol style="list-style-type: none"> 1. Ian Sommerville, Software Engineering 10th, 2019. 2. Hyrum Wright, Titus Winters, and Tom Mansreck. Software Engineering at Google, 2020 3. Hans van Vliet, Software Engineering: Principles and Practice 3rd, 2008 																																	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

		SLO				
		CLO 1	2	3	4	5
CLO		1				6
1						XXX
2				XX		XXX
3			XX		XXX	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Software development in practice	1	Quiz	Lecture	[1]

2	Beginning a project	1,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,3]
3	Requirements	2,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,2]
4	The user experience	2,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,2]
5	System design	2,3	Quiz, Midterm, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
6	Midterm				
7	Program development	2,3	Quiz, Final, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
8	Reliability and testing	2,3	Quiz, Final, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
9	The business of software development	2,3	Quiz, Project	Lecture, Discussion, In-class, exercise	[1,2,3]
10	Review	1,3	Quiz	Discussion, In-class, exercise	[1,2]
11	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (25%)	30%	20%	
Projects/Presentations/ Report (25%)	30%	30%	60%
Final examination (40%)	30%	40%	
Exercises/ Quiz (10%)	10%	10%	40%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports				
Student:	HW/Assignment:	Date:	Evaluator:	
		Max.	Score	Comments
Technical content (60%)				
Abstract clearly identifies purpose and summarizes principal content	10			
Introduction demonstrates thorough knowledge of relevant background and prior work	15			
Analysis and discussion demonstrate good subject mastery	30			
Summary and conclusions appropriate and complete	5			
Organization (10%)				
Distinct introduction, body, conclusions	5			

Content clearly and logically organized, good transitions	5	
Presentation (20%)		
Correct spelling, grammar, and syntax	10	
Clear and easy to read	10	
Quality of Layout and Graphics (10%)	10	
TOTAL SCORE	100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
Explanation of issues			
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>			
Influence of context and assumptions			

Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

A handwritten signature in blue ink, appearing to read "Nguyen Van Sinh".

Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Net-centric Programming

Course Code: IT096

1. General information

Course designation	Advanced programming course with focus on developing network application
Semester(s) in which the course is taught	6
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Compulsory (NE) Elective (CS)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	Advanced programming with a focus on developing software for networked systems using UNIX as a reference platform. Topics: Programming Tools, Software Design, Programming Techniques, Environment of a UNIX Process, Memory Allocation, Garbage Collection, Process Control, Process Relationships, Signals, Reliable Signals, Threads, I/O Multiplexing, Datagram and Stream Sockets,

	Multicasting, Device Driver and Kernel Programming, Secure Programming																																																
Course learning outcomes	<p>CLO 1. Understand the structure of network applications CLO 2. Able to develop network applications using TCP and UDP sockets CLO 3. Understand and implement network applications using popular Internet protocols CLO 4. Team working</p>																																																
	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>1, 2, 3</td></tr> <tr> <td>Skill</td><td>2, 3</td></tr> <tr> <td>Attitude</td><td>4</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	1, 2, 3	Skill	2, 3	Attitude	4																																								
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Topic	Weight	Level																																															
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Remote Procedure Call (RPC)	3	T, U																																															
Examination forms	Multiple-choice questions, short-answer questions																																																
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>																																																
Reading list	<ol style="list-style-type: none"> Michael J.Donahoo, Kenneth L.Calvert, TCP/IP Socket in C: A Practical Guide for Programmers 2nd, 2009 																																																

	2.	W. R. Stevens, B. Fenner, A. M. Rudoff, Unix Network Programming, Vol. 1: The Sockets Networking API 3rd, 2003
	3.	Brandon Rhodes, Foundations of Python Network Programming 3rd, 2014

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLO	1	2	3	4	5	6
1	x					
2		xx				
3		xxx				
4				x		

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Network revisions	1	Quiz	Lecture	2
2	Introduction to Client/Server networking and Socket Programming	2	Quiz, Lab, Midterm	Lecture	1
3	TCP Socket Programming	2	Quiz, Lab, Midterm	Lecture, Discussion	1, 2
4	UDP Socket Programming	2	Quiz, Lab, Midterm	Lecture, Discussion	1, 2
5	Socket name and DNS	2	Quiz, Lab, Midterm	Lecture, Discussion	2, 3
6	Network Data and Network Errors	2	Quiz, Lab, Midterm	Lecture, Discussion	2, 3
7	Caches and Message Queries	2	Quiz, Lab, Midterm	Lecture, Discussion	2, 3
8	HTTP Clients	3, 4	Quiz, Lab, Final	Lecture, Discussion	2, 3
Midterm exam					
9	HTTP Server	3, 4	Quiz, Lab, Final	Lecture, Discussion	2, 3
10	Web Socket, Web Frame Work	3, 4	Quiz, Final	Lecture, Discussion	2, 3
11	Web Scraping	3, 4	Quiz, Final	Lecture, Discussion	2, 3
12	Building and Parsing Email	3	Quiz, Final	Lecture, Discussion	2, 3
13	FTP	3	Quiz, Final	Lecture, Discussion	2, 3
14	Telnet and SSH	3	Quiz, Final	Lecture, Discussion	2, 3
15	Remote Procedure Call (RPC)	3	Quiz, Final	Lecture, Discussion	2, 3
Final exam					

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz / Assignment (10%)		10%	10%	100%
Labs (20%)	30%	30%	40%	100%
Midterm examination (30%)	70%	40%		
Final examination (40%)		20%	50%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

-
- When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted. ↴

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports				
Student:	HW/Assignment:	Evaluator:	Max.	Score
Comments				
Technical content (60%)				
Abstract clearly identifies purpose and summarizes principal content	10			
Introduction demonstrates thorough knowledge of relevant background and prior work	15			
Analysis and discussion demonstrate good subject mastery	30			
Summary and conclusions appropriate and complete	5			
Organization (10%)				
Distinct introduction, body, conclusions	5			
Content clearly and logically organized, good transitions	5			
Presentation (20%)				
Correct spelling, grammar, and syntax	10			
Clear and easy to read	10			
Quality of Layout and Graphics (10%)				
TOTAL SCORE	100			

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.

1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone		Benchmark	
		4	3	2	1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation/ without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.	Information is taken from source(s) without any interpretation/ evaluation.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position. Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions, identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	Specific position (perspective, thesis/hypothesis) is stated.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark
	4	3	2

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Digital Image Processing

Course Code: IT130

1. General information

Course designation	This course provides students fundamental knowledge of digital image processing
Semester(s) in which the course is taught	7
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Elective (All programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	This course helps students discuss digital image processing fundamentals; review of Digital Signal Processing algorithms such as Discrete Fourier Transform; intensity transforms, frequency domain filtering; image restoration and reconstruction; color image processing; multiresolution processing; image compression; morphological image processing.
Course objectives	CLO 1. Understand bases of digital image formation. CLO 2. Understand the color image foundations. ♦ CLO 3. Apply special-domain image filtering.
Course learning outcomes	

	Competency level	Course learning outcome (CLO)
Knowledge	1,2	
Skill	3	
Attitude		
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	
Topic	Weight	Level
Chapter 1: Introduction	3	I, T
Chapter 2: Digital Image Fundamentals	6	I, T
Chapter 3: Intensity Transformations and Spatial Filtering (part 1)	3	T, U
Chapter 3: Intensity Transformations and Spatial Filtering (part 2)	6	T, U
Chapter 4: Filtering in the frequency domain	6	T, U
Chapter 5: Image restoration and reconstruction	3	T, U
Chapter 6: Color Image processing	3	T, U
Chapter 7: Wavelets and multiresolution processing (part 1)	3	T, U
Chapter 7: Wavelets and multiresolution processing (part 2)	3	T, U
Chapter 8: Image compression	3	T, U
Chapter 9: Morphological image processing	3	T, U
Chapter 10: Image segmentation	3	T, U
Chapter 11: Representation and description	3	T, U
Chapter 12: Object recognition	3	T, U
Revision Application Design and Development	3	
Examination forms	Multiple-choice questions, short-answer questions	
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>	
Reading list	<ol style="list-style-type: none"> 1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing 3rd, 2008 	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x	x				
2	x	x				
3					x	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessment	Learning activities	Resources
1	Chapter 1: Introduction	1,2	Quiz, Lab, Exam	lecture, exercises	
2	Chapter 2: Digital Image Fundamentals	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
3	Chapter 3: Intensity Transformations and Spatial Filtering (part 1)	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
4	Chapter 3: Intensity Transformations and Spatial Filtering (part 2)	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
5	Chapter 4: Filtering in the frequency domain	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
6	Chapter 5: Image restoration and reconstruction	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
7	Chapter 6: Color Image processing	1,2	Quiz, Lab, Exam	lecture, exercises, lab	
8	Midterm				
9	Chapter 7: Wavelets and multiresolution processing (part 1)	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
10	Chapter 7: Wavelets and multiresolution processing (part 2)	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
11	Chapter 8: Image compression	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
12	Chapter 9: Morphological image processing	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
13	Chapter 10: Image segmentation	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
14	Chapter 11: Representation and description	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
15	Chapter 12: Object recognition	2,3	Quiz, Lab, Exam	lecture, exercises, lab	
16	Revision Application Design and Development	1,2,3			
17	Final exam				

3. Assessment plan

Assessment Type	CLO1	CLO2	CLO3
Labs (20%)	20%	20%	20%
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	40%	40%	40%
Exercises/ Quiz (10%)	10%	10%	10%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
		Max.	Score
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)			
	TOTAL SCORE	100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.

0	No response/task not attempted
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Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric *Critical thinking value rubric for evaluating questions in exams:*

	Capstone	Milestone	Benchmark		
			4	3	2
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.	Issue/problem to be considered critically is stated without any interpretation/evaluation.
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.	Information is taken from source(s) without any interpretation/ evaluation.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions).
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are oversimplified.	Conclusion is inconsistently tied to some of the information discussed;	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Mobile Application Development

Course Code: IT133

1. General information

Course designation	Advanced programming course with focus on mobile environment
Semester(s) in which the course is taught	7
Person responsible for the course	MSc. Le Thanh Son
Language	English
Relation to curriculum	Elective (All programs)
Teaching methods	Lecture
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-oriented analysis and design
Course objectives	This course is designed to introduce and familiarize students with programming in the mobile environment. Android platform will be used throughout the course. The course starts with introductions to basic components, concepts, structures of Android applications then move on with common user interface elements, persistent storage, database for mobile etc. Introduction to most common tools and techniques for writing Android application is also included with hands on experience in form of lab exercise programming project.

Course learning outcomes	<p>CLO 1. Understand the structure of mobile application, especially Android application</p> <p>CLO 2. Understand most common mobile platform user interface, database, services</p> <p>CLO 3. Able to develop mobile application</p> <p>CLO 4. Team working</p>
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: Lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>
Examination forms	<p>Multiple-choice questions, short-answer questions</p>
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>
Reading list	<ol style="list-style-type: none"> 1. C. Stewart, K. Marsicano, Android Programming: The Big Nerd Ranch Guide 3rd, 2017 2. D. Griffiths, Head First Android Development: A Brain-Friendly Guide 1st, 2015

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO\SLO	1	2	3	4	5	6
1	x					
2	x					
3		xx			xxx	
4			x			xxx

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to mobile programming	1	Quiz	Lecture	2
2	Android and Modal View Controller	1	Quiz	Lecture	2
3	Activity Lifecycle	1	Quiz	Lecture	2
4	Adroid SDK Versions and Compatibility	1	Quiz, Lab, Midterm	Lecture, Discussion	2
5	Creating UI: Layout and Widgets	2, 3, 4	Quiz, Lab, Midterm	Lecture, In-class Exercise	1
6	ListFragment	2, 3, 4	Quiz, Lab, Midterm	Discussion, In-class Exercise	1
7	ViewPager	2, 3, 4	Quiz, Lab, Midterm	Lecture, In-class Exercise	1
8	Dialogs	2, 3, 4	Quiz, Lab, Midterm	Lecture, Discussion, In-class Exercise	1
Midterm					
9	MediaPlayer	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
10	Action Bar	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
11	Saving and Loading Local Files	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
12	Context Menu and Contextual Action Mode	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1

13	Taking Pictures and Handling Images	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
14	Intents	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
15	Browsing the Web & WebView	2, 3, 4	Quiz, Lab, Final	Lecture, Discussion, In-class Exercise	1
	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz / Assignment (10%)	50%	10%	10%	70%
Labs (20%)	10%	30%	30%	30%
Midterm examination (30%)	30%	30%	30%	
Final examination (40%)	10%	30%	30%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports				
Student:	HW/Assignment:	Date:	Evaluator:	
		Max.	Score	Comments
Technical content (60%)				
Abstract clearly identifies purpose and summarizes principal content	10			
Introduction demonstrates thorough knowledge of relevant background and prior work	15			
Analysis and discussion demonstrate good subject mastery	30			
Summary and conclusions appropriate and complete	5			
Organization (10%)				
Distinct introduction, body, conclusions	5			
Content clearly and logically organized, good transitions	5			
Presentation (20%)				
Correct spelling, grammar, and syntax	10			
Clear and easy to read	10			
Quality of Layout and Graphics (10%)				
TOTAL SCORE	100			

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW
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Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response.
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	2
Explanation of issues	<p>Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.</p>	<p>Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.</p>	<p>Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.</p>
Evidence Selecting and using information to investigate a point of view or conclusion	<p>Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.</p>	<p>Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.</p>	<p>Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.</p>
Influence of context and assumptions	<p>Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.</p>	<p>Identifies own and others' assumptions and several relevant contexts when presenting a position.</p>	<p>Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).</p>
Student's position (perspective, thesis/hypothesis)	<p>Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).</p>	<p>Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).</p>	<p>Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.</p>
Conclusions and related outcomes (implications and consequences)	<p>Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.</p>	<p>Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.</p>	<p>Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.</p>

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone			Benchmark 1
		3	2	1	
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understanding of the presentation, and speaker appears uncomfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities)
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Internet of Things

Course Code: IT134

1. General information

Course designation	The course explains the architecture, components of Internet of Thing networks.
Semester(s) in which the course is taught	
Person responsible for the course	Dr. Le Duy Tan
Language	English
Relation to curriculum	Elective (All programs)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Computer Networks
Course objectives	The students will study the communication techniques between the components from short range to long range such as Bluetooth, Zigbee, Wi-fi, Lora, NB-IoT, ... Moreover, the data storage, organization and analytics are also studied in this course.
Course learning outcomes	CLO 1. The ability of designing and implementing some Internet of Thing systems; CLO 2. The ability of collecting data then applying some data mining techniques to analyze the data in some IoT applications.

	Competency level	Course learning outcome (CLO)																											
Knowledge	CLO 1																												
Skill	CLO 1 and CLO 2																												
Attitude	CLO 1																												
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th></tr> </thead> <tbody> <tr> <td>Week 1: Introduction to Internet of Things</td><td>1</td><td>T</td></tr> <tr> <td>Week 2 : IoT applications (1st presentation from industry)</td><td>1</td><td>U</td></tr> <tr> <td>Week 3: Sensors and actuators in IoTs</td><td>1</td><td>T</td></tr> <tr> <td>Week 4-8: Communication technologies in IoTs; PAN (Bluetooth, Zigbee), LAN (IEEE 802.11), WAN (LoRa, LTE)</td><td>5</td><td>T</td></tr> <tr> <td>Week 9: Data collection in IoT</td><td>1</td><td>T, U</td></tr> <tr> <td>Week 10: IoT applications (cont.) (2nd presentation from industry)</td><td>1</td><td>U</td></tr> <tr> <td>Week 11-14: Data analytics</td><td>4</td><td>T, U</td></tr> <tr> <td>Week 15: Review</td><td>1</td><td>U</td></tr> </tbody> </table>		Topic	Weight	Level	Week 1: Introduction to Internet of Things	1	T	Week 2 : IoT applications (1st presentation from industry)	1	U	Week 3: Sensors and actuators in IoTs	1	T	Week 4-8: Communication technologies in IoTs; PAN (Bluetooth, Zigbee), LAN (IEEE 802.11), WAN (LoRa, LTE)	5	T	Week 9: Data collection in IoT	1	T, U	Week 10: IoT applications (cont.) (2nd presentation from industry)	1	U	Week 11-14: Data analytics	4	T, U	Week 15: Review	1	U
Topic	Weight	Level																											
Week 1: Introduction to Internet of Things	1	T																											
Week 2 : IoT applications (1st presentation from industry)	1	U																											
Week 3: Sensors and actuators in IoTs	1	T																											
Week 4-8: Communication technologies in IoTs; PAN (Bluetooth, Zigbee), LAN (IEEE 802.11), WAN (LoRa, LTE)	5	T																											
Week 9: Data collection in IoT	1	T, U																											
Week 10: IoT applications (cont.) (2nd presentation from industry)	1	U																											
Week 11-14: Data analytics	4	T, U																											
Week 15: Review	1	U																											
Examination forms	Multiple-choice questions, short-answer questions																												
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>																												
Reading list	<p>[1] Raj Kamal, Internet of Things Architecture and Design Principles, Mc Graw Hill India, 2017</p> <p>[2] Hanes, David, et al. IoT fundamentals: Networking technologies, protocols, and use cases for the internet of things. Cisco Press, 2017.</p> <p>[3] Singh, Rajesh, et al. Internet of things with Raspberry Pi and Arduino. CRC Press, 2019.</p>																												

	[4] Dow, Colin. Internet of things programming projects: build modern IoT solutions with the Raspberry Pi 3 and Python. Packt Publishing Ltd, 2018.
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2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO	SLO	1	2	3	4	5	6
1		✓	✓	✓		✓	
2							✓

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Internet of Things	1, 2	Homework	Lecture, Discussion, Inclass-Quiz	[1]
2	IoT applications (1st presentation from industry)	1	Homework	Lecture, Group work	[2]
3	Sensors and actuators in IoTs	1	Homework	Lecture, Discussion, Inclass-Quiz	[1]
4	Midterm		Written exam		
5 - 9	Communication technologies in IoTs: PAN (Bluetooth, Zigbee), LAN (IEEE 802.11), WAN (LoRa, LTE)	1	Homework	Lecture, Discussion, Inclass-Quiz	[1] [2]
10	Data collection in IoT	2	Homework	Lecture, Discussion, Inclass-Quiz	[1]
11	IoT applications (cont.) (2nd presentation from industry)	1, 2	Homework	Lecture, Group work	[2]
12 - 14	Data analytics	2	Homework	Lecture, Discussion, Inclass-Quiz, Presentation	[1]
15	Week 15: Review		Homework	Review-Test	
	Final exam		Written exam		

4. Assessment plan

Assessment Type	CLO1	CLO2
Quiz (5%)		10%
Labs (20%)	20%	20%
Midterm examination (30%)	30%	20%
Projects/Presentations/ Report (5%)	25%	
Final examination (40%)	25%	50%

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports					
Student:	Date:	HW/Assignment:	Evaluator:	Max.	Score
Technical content (60%)					
Abstract clearly identifies purpose and summarizes principal content		10			
Introduction demonstrates thorough knowledge of relevant background and prior work	15				
Analysis and discussion demonstrate good subject mastery	30				
Summary and conclusions appropriate and complete	5				
Organization (10%)					
Distinct introduction, body, conclusions	5				
Content clearly and logically organized, good transitions	5				
Presentation (20%)					
Correct spelling, grammar, and syntax	10				
Clear and easy to read	10				
Quality of Layout and Graphics (10%)					
		TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric
Critical thinking value rubric for evaluating questions in exams:

	Capstone	4	3	Milestone	2	Benchmark	Benchmark
							1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively; delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or descriptions.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.
Student's position (perspective, thesis/hypothesis)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	4	3	Milestone	2	Benchmark
						1

Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Data Mining

Course Code: IT160

1. General information

Course designation	This subject introduces the students to the principles and algorithms of data mining, and the requirements of a data mining process.
Semester(s) in which the course is taught	6,8
Person responsible for the course	Dr. Nguyen Thi Thanh Sang
Language	English
Relation to curriculum	Elective (CS, NE, CE) Compulsory (DS)
Teaching methods	Lecture, lesson, project, laboratory.
Workload (incl. contact hours, self-study hours)	(Estimated) Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming
Course objectives	Students will study data mining concepts and algorithms to solve problems of knowledge discovery. They will be equipped with skills of using recent data mining software for solving practical problems and gain experience of doing independent study and research.
Course learning outcomes	

	Competency level	Course learning outcome (CLO)
	Knowledge	CLO 1. Understand basic contents of data warehousing and data mining. CLO 2. Explain modern algorithms in the area of data mining and knowledge discovery.
	Skill	CLO 3. Apply data mining techniques to some case studies using existing datasets.
	Attitude	CLO 4. Work in a team to build a data mining process.
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	
Topic	Weight	Level
Introduction to Data Mining	1	I
Know your data	1	T, U
Data preprocessing	1	T, U
Data mining knowledge representation	1	T, U
Evaluating what's been learned	1	T
Data mining algorithms: Classification	2	T, U
Mining Frequent Patterns, Association and Correlations: Basic Concept and Methods	2	T
Data mining algorithms: Clustering	2	T
Classification: Advanced Methods	1	T, I
Semantic data mining	1	I
Examination forms	Multiple-choice questions, short-answer questions	
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>	
Reading list	<p>[1] Jiawei Han, Micheline Kamber, <i>Data Mining: Concepts and Techniques</i>, 3rd Edition, 2011.</p> <p>[2] Ian H. Witten, Eibe Frank, Mark A. Hall, and Christopher J. Pal, <i>Data Mining: Practical Machine Learning Tools and Techniques</i>, Fourth Edition, Morgan Kaufmann, 2016.</p> <p>[3] A. Lawrynowicz, <i>Semantic Data Mining: An Ontology-based Approach (Studies on the Semantic Web)</i>, IOS Press (April 15, 2017), ISBN-10 1614997454.</p>	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO	SLO					
	1	2	3	4	5	6
1	x					
2	x					
3					x	
4				x		

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Data Mining	1		Lecture, Discussion	[1, 2]. Chapter 1
2	Know your data	1	Quiz.s2	Lecture, In-class quiz	[1]. Chapter 2
3	Data preprocessing	1,4		Lecture, Discussion	[1]. Chapter 3
4	Data mining knowledge representation	1	Quiz.s4	Lecture, In-class quiz	[2]. Chapter 3; Reading [1]. Chapter 4 – Data Warehousing
5	Evaluating what's been learned	1	Quiz.s5	Lecture, In-class quiz	[2]. Chapter 5
6-7	Data mining algorithms: Classification	2,3	Quiz.s6-7	Lecture, In-class quiz	[1]. Chapter 8; [2]. Chapter 4.3
8	Data mining to code	3		Lecture, Discussion	
9	Midterm				
10-11	Mining Frequent Patterns, Association and Correlations: Basic Concept and Methods	2,3,4	Quiz.s10-11	Lecture, In-class quiz	[1]. Chapter 6; [2]. Chapter 4.5
12-13	Data mining algorithms: Clustering	2,3,4	Quiz.s12-13	Lecture, In-class quiz	[1]. Chapter 10; [2]. Chapter 4.8
14	Classification: Advanced Methods	2	Quiz.s14	Lecture, In-class quiz	[1]. Chapter 9
15	Semantic data mining	2		Lecture, Discussion	[3]
16	Revision			Review-test	

17	Final exam
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Laboratory

Week	Lab
5	Introduction to Weka
6	Evaluation
7	Simple classifiers
8	Programming - Pre-processing data
9	More classifiers
10	Putting it all together
11	Programming - Clustering
12	Programming - Sequential pattern discovery

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Labs (10%)			100%	
Programming (20%)			70%	30%
Midterm examination (30%)	50%	50%		
Final examination (40%)	40%	60%		

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
Technical content (60%)		Max.	Score
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)		Max.	Score
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)		Max.	Score
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		Max.	Score
TOTAL SCORE	100		

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Explanation of issues	Capstone	Milestone	Benchmark	
		4	3	2	1
		Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.
		Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions		Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)		Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.

Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.
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Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: IT Project Management

Course Code: IT056

1. General information

Course designation	This subject introduces to students the process of IT project management; the area of knowledge required and techniques appropriate for successful IT project management.
Semester(s) in which the course is taught	7
Person responsible for the course	Assoc. Prof. Nguyen Van Sinh
Language	English
Relation to curriculum	All programs: Elective course
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Web application development Software engineering
Course objectives	This course provides students the fundamental IT project management knowledge, with particular emphasis on software products, project management and contemporary issues in the delivery of software solutions to business. It considers plan-driven and agile methodologies, estimating techniques, change management, risk management, and the role of project management in business.

	<p>And it identifies the managerial control and reporting aspects necessary from inception to implementation of a software development project.</p> <p>CLO 1. Explain the IT project management process;</p> <p>CLO 2. Identify the areas of knowledge required for successful IT project management;</p> <p>CLO 3. Apply techniques appropriate for successful software project management;</p> <p>CLO 4. Communicate effectively to the team and stakeholders; construct project related documentation.</p>																																																
Course learning outcomes	<table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1</td></tr> <tr> <td>Skill</td><td>CLO2, CLO3</td></tr> <tr> <td>Attitude</td><td>CLO4</td></tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO1	Skill	CLO2, CLO3	Attitude	CLO4																																								
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Reading list	<ol style="list-style-type: none"> 1. Kathy Schwalbe, IT Project Management - 9th Edition, 2019 2. Stellman and Greene, <i>Applied Software Project Management</i>, O'Reilly Media, 2006. 																																																

	3. Marchewka, J.T., Information Technology Project Management Providing Measureable Organizational Value 5th, 2016
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2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO	SLO				
CLO 1	2	3	4	5	6
1	X				
2	X	X			
3	X			X	
4		X	X	X	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Orientation & Introduction to the course	1	Question and answer	Lecture,	[1, 2, 3]
2	Introduction to IT project management	1	Question and answer	Lecture, Discussion, In-class exercises	[1, 2, 3]
3	Software project planning	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
4	Estimation (cost, time, scope)	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
5	Project Schedules	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
6	Review process	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
7	Software Requirement	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
8	Design & Programming	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]

9	Review for midterm examination	1,2,3		Discussion, In-class exercises
10	Design and Programming	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises [1, 2, 3]
11	Software Testing	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises [1, 2, 3]
12	Understanding Change	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises [1, 2, 3]
13	Management and Leadership	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises [1, 2, 3]
14	Managing an Outsourced Project	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises [1, 2, 3]
15	Process Improvement.	2,3,4	Quiz, Lab, Final exam	Lecture, Discussion, In-class exercises [1, 2, 3]
16	Final examination	2,3,4		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Midterm examination (30%)	40%	50%		
Projects/Presentations/ Report (20%)		40%	30%	30%
Final examination (40%)			70%	30%
Exercises/ Quiz (10%)	25%	25%	25%	25%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist	Grading checklist for Written Reports
Student: Date:	HW/Assignment: Evaluator:

	Max.	Score	Comments
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone	Milestone	Benchmark	
	4	3	2	1
	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/ or backgrounds unknown.	Issue/ problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is partially observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and

	and speaker appears polished and confident.	and speaker appears comfortable.	understandable, and speaker appears tentative.	speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Computer Graphics

Course Code: IT024

1. General information

Course designation	This subject introduces the students to principles and algorithms of computer graphics and requirements of creating graphical applications.	
Semester(s) in which the course is taught	6	
Person responsible for the course	Assoc.Prof. Nguyen Van Simh	
Language	English	
Relation to curriculum	Elective course (CS)	
Teaching methods	Lecture, lesson, project, seminar.	
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120	
Credit points	Number of credits: 4	Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Object-Oriented Programming Discrete mathematics	
Course objectives	This course provides students the fundamentals of computer graphics concepts, methodologies, and processes. It develop an understanding of the algorithms and fundamental techniques for generating and modifying pictures/objects with a digital computer, including the handling of color, and the generation of visible-surface projections of three dimensional scenes, for applications in science, engineering, and the entertainment world (i.e. connect to the VR & AR application; Games industry and Images processing).	

Course learning outcomes	<p>CLO 1. Understand and apply the algorithms and fundamental techniques for generating and modifying pictures, 2D/3D objects with a digital computer.</p> <p>CLO 2. Understand and apply the handling of color, and the generation of visible-surface projections of 3D scenes, for applications in science, engineering and the entertainment world.</p> <p>CLO 3. Apply knowledge of mathematics and ability in graphical programming to develop games, construct and reconstruct 2D/3D objects, process images, VR & AR, etc.</p> <p>CLO 4. Work in a team to ready build a computer graphics application</p> <table border="1"> <thead> <tr> <th>Competency level</th><th>Course learning outcome (CLO)</th></tr> </thead> <tbody> <tr> <td>Knowledge</td><td>CLO1</td></tr> <tr> <td>Skill</td><td>CLO2, CLO3</td></tr> <tr> <td>Attitude</td><td>CLO4</td></tr> </tbody> </table> <p>Content</p> <p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 teaching hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Topic</th><th>Weight</th><th>Level</th><th></th></tr> </thead> <tbody> <tr> <td>Week 1: Introduction to Computer Graphics, Mathematics Foundation</td><td>3</td><td>I,T</td><td></td></tr> <tr> <td>Week 2: Bessenham algorithms</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 3: Line clipping</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 4: Polygon clipping</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 5: Transformation and Perspective</td><td>3</td><td>I,T</td><td></td></tr> <tr> <td>Week 6: Transformation (cont.)</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 7: Introduction to OpenGL programing</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 8: View Transformation + Midterm</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 9: 3D clipping</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 10: Visual Surface Determination</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 11: Color Models</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 12: Image Rendering and Generation</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 13: Ray Tracing & Texture Mapping</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 14: Bezier Curve and Surface processing</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Week 15: Building graphics application; final review</td><td>3</td><td>I,T,U</td><td></td></tr> <tr> <td>Examination forms</td><td>Multiple-choice questions, short-answer questions (computing and programing)</td><td></td><td></td></tr> <tr> <td>Study and examination requirements</td><td>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. 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| | 2. Frank Klawonn , Introduction to Computer Graphics Using Java 2D and 3D, 2nd Edition, Springer 2012.
3. Sumantha Guha, Computer Graphics Through OpenGL From Theory to Experiments Third Edition (AIT), CRC Press, 2019.
4. John Vince, Mathematics for Computer Graphics, 5th Edition, Springer 2017. |
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2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

		SLO				
CLO	1	2	3	4	5	6
1	X	X				
2	X	X				
3		X			X	
4					X	

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Computer Graphics, Mathematics Foundation	1	Quiz	Lecture,	[1, 4]
2	Bessenham algorithms	1,2	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
3	Line clipping	1,2	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
4	Polygon clipping	1,2	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
5	Transformation and Perspective	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
6	Transformation (cont.)	2,3	Quiz, Lab, Midterm exam	Lecture, Discussion, In-class exercises	[1, 2, 3]
7	Introduction to OpenGL	2,3,4	Quiz, Lab, Midterm exam	Lecture, Discussion,	[1, 2, 3]

			In-class exercises
8	Midterm		
9	View Transformation	2, 3	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
10	3D clipping	2, 3	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
11	Visual Surface Determination	2, 3	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
12	Color Models	2, 3	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
13	Image Rendering and Generation	2,3,4	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
14	Ray Tracing & Texture Mapping	2,3,4	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
15	Bezier Curve and Surface processing	2,3,4	Quiz, Lab, Final exam
			Lecture, Discussion, In-class exercises
16	Building graphics application; final review	2,3,4	Quiz, Lab, Final exam
			Lecture, Discussion, Homework
17	Final exam		

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Labs (20%)		30%	30%	40%
Midterm examination (30%)	40%	60%		
Final examination (40%)		50%	50%	
Exercises/ Quiz (10%)	30%	40%	30%	

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports					
Student:	HW/Assignment:	Evaluator:	Max.	Score	Comments
Technical content (60%)					
Abstract clearly identifies purpose and summarizes principal content	10				
Introduction demonstrates thorough knowledge of relevant background and prior work	15				
Analysis and discussion demonstrate good subject mastery	30				
Summary and conclusions appropriate and complete	5				
Organization (10%)					
Distinct introduction, body, conclusions	5				
Content clearly and logically organized, good transitions	5				
Presentation (20%)					
Correct spelling, grammar, and syntax	10				
Clear and easy to read	10				
Quality of Layout and Graphics (10%)					
TOTAL SCORE	100				

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark	
	4	3	2	
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.

Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understanding, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Software Architecture

Course Code: IT114

1. General information

Course designation	This course provides student methodologies and techniques in Software Architecture.
Semester(s) in which the course is taught	7
Person responsible for the course	Dr. Ha Viet Uyen Synh
Language	English
Relation to curriculum	Elective (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours: 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	
Course objectives	Provides the student with a thorough understanding of varying methodologies and techniques in analysis, design and implementation of information system by using UML.
Course learning outcomes	CLO 1. Understand the steps of the System Development Life Cycle and the techniques for each step CLO 2. Using a CASE tool in analysis and design of a system. CLO 3. Apply to a real system

		Competency level	Course learning outcome (CLO)
Knowledge		1,2	
Skill		3	
Attitude			
Content	<i>The description of the contents should clearly indicate the weighting of the content and the level.</i> Weight: lecture session (3 hours) Teaching levels: I (Introduce); T (Teach); U (Utilize)		
Topic	Weight	Level	
Introduction to systems analysis and design,	3	I	
Requirements.	3	T,U	
Use Case Modeling	6	T,U	
Dynamic Modeling	6	T,U	
State-Dependent Dynamic Interaction Modeling	6	T,U	
Data Modeling	6	T,U	
Normal Forms	6	T,U	
Structural Modeling	6	T,U	
Architectural Design.	3	I,T	
Examination forms	Multiple-choice questions, short-answer questions		
Study and examination requirements	Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged. Assignments/Examination: Students must have more than 50/100 points overall to pass this course.		
Reading list	<ol style="list-style-type: none"> 1. Kenneth E. Kendall, Julie E. Kendall, Systems Analysis and Design 7th, 2006 2. Gary B. Shelly, Thomas J. Cashman, Harry J. Rosenblatt, Systems Analysis and Design 4th, 2001 		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

CLO	SLO				
1	1	2	3	4	5
2			x		
3		x			

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to systems analysis and design,	1,2	Quiz	lecture, exercises	
2	Requirements.	1,2,3	Quiz, Lab	lecture, exercises, lab	
3	Use Case Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
4	Midterm				
5	Dynamic Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
6	State-Dependent Dynamic Interaction Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
7	Data Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
8	Normal Forms	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
9	Structural Modeling	1,2,3	Quiz, Lab, Exam	lecture, exercises, lab	
10	Architectural Design.	1,2	Quiz	lecture, exercises	
11	Final exam				

4. Assessment plan

Assessment Type

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (30%)	30%	30%	30%
Final examination (40%)	40%	40%	40%
Exercises/ Quiz (10%)	10%	10%	10%
Lab. Assignments (20%)	20%	20%	20%

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports			
Student:	HW/Assignment:	Date:	Evaluator:
		Max.	Score
Technical content (60%)			
Abstract clearly identifies purpose and summarizes principal content	10		
Introduction demonstrates thorough knowledge of relevant background and prior work	15		
Analysis and discussion demonstrate good subject mastery	30		
Summary and conclusions appropriate and complete	5		
Organization (10%)			
Distinct introduction, body, conclusions	5		
Content clearly and logically organized, good transitions	5		
Presentation (20%)			
Correct spelling, grammar, and syntax	10		
Clear and easy to read	10		
Quality of Layout and Graphics (10%)		10	
TOTAL SCORE		100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW	
Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Explanation of issues	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without any interpretation or description.
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: Information System Management

Course Code: IT094

1. General information

Course designation	This course covers the concepts of information systems and their applications to business processes
Semester(s) in which the course is taught	6
Person responsible for the course	Dr. Tran Thanh Tung
Language	English
Relation to curriculum	Elective course (CS, DS) Specialization (required) (NE)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits : 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	Principles of Database Management
Course objectives	This course will aim to provide students with: The concepts of information systems and their applications to business processes. Use of computer-based information systems in functional areas of business. Understanding of computer and information technology, resources, management and end-user decision making, and system development.

Course learning outcomes	<p>CLO 1. understand basic information system concepts as applied to business operations and management.</p> <p>CLO 2. identify the major components of a computer system, including hardware, software, operating systems and operating environments as they apply to information systems.</p> <p>CLO 3. develop basic MIS applications such as spreadsheet, database, and web development.</p>																																				
Content	<p>Competency level Course learning outcome (CLO)</p> <table border="1"> <tr> <td>Knowledge</td> <td></td> </tr> <tr> <td>Skill</td> <td></td> </tr> <tr> <td>Attitude</td> <td></td> </tr> </table> <p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p>	Knowledge		Skill		Attitude																															
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Examination forms	<table border="1"> <thead> <tr> <th>Topic</th> <th>Weight</th> <th>Level</th> </tr> </thead> <tbody> <tr> <td>Information Systems in Global Business;</td> <td>1</td> <td>I</td> </tr> <tr> <td>Global E-Business and Collaboration;</td> <td>1</td> <td>I</td> </tr> <tr> <td>Information Systems, Organizations and Strategy</td> <td>2</td> <td>T</td> </tr> <tr> <td>Ethical and Social Issues in Information Systems;</td> <td>1</td> <td>T</td> </tr> <tr> <td>Telecommunications, the Internet, and Wireless Technology;</td> <td>1</td> <td>T</td> </tr> <tr> <td>Foundations of Business Intelligence: Databases and Information Management</td> <td>1</td> <td>T,U</td> </tr> <tr> <td>E-Commerce: Digital Markets, Digital Goods;</td> <td>2</td> <td>T,U</td> </tr> <tr> <td>Achieving Operational Excellence and Customer Intimacy: Enterprise Applications;</td> <td>2</td> <td>T,U</td> </tr> <tr> <td>Building Information Systems;</td> <td>2</td> <td>T,U</td> </tr> <tr> <td>Managing Knowledge;</td> <td>1</td> <td>T</td> </tr> <tr> <td>Enhancing Decision Making.</td> <td>1</td> <td>T</td> </tr> </tbody> </table>	Topic	Weight	Level	Information Systems in Global Business;	1	I	Global E-Business and Collaboration;	1	I	Information Systems, Organizations and Strategy	2	T	Ethical and Social Issues in Information Systems;	1	T	Telecommunications, the Internet, and Wireless Technology;	1	T	Foundations of Business Intelligence: Databases and Information Management	1	T,U	E-Commerce: Digital Markets, Digital Goods;	2	T,U	Achieving Operational Excellence and Customer Intimacy: Enterprise Applications;	2	T,U	Building Information Systems;	2	T,U	Managing Knowledge;	1	T	Enhancing Decision Making.	1	T
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Building Information Systems;	2	T,U																																			
Managing Knowledge;	1	T																																			
Enhancing Decision Making.	1	T																																			
Study and examination requirements	<p>Multiple-choice questions, short-answer questions</p> <p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>																																				
Reading list	<ol style="list-style-type: none"> 1. Kenneth C. Laudon, Jane P. Laudon, Management Information Systems: Managing the Digital Firm 14th, 2016 2. Kenneth C. Laudon and Jane Laudon, Essentials of Management Information Systems 11th, 2015 																																				

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	SLO					
CLO	1	2	3	4	5	6
1	x		x			
2		x	x			
3		x				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Learning Resources
1	Information Systems in Global Business;	1	Midterm exam	In-class activities	
2	Global E-Business and Collaboration;	1	Midterm exam	In-class activities	
3	Information Systems, Organizations and Strategy	1,2	Midterm exam, Quiz	In-class activities, Lab	
4	Ethical and Social Issues in Information Systems;	1	Midterm exam		
5	Telecommunications, the Internet, and Wireless Technology;	2	Midterm exam	In-class activities, Lab	
6	Midterm				
7	Foundations of Business Intelligence: Databases and Information Management	2,3	Final exam	In-class activities, Lab	
8	E-Commerce: Digital Markets, Digital Goods;	1	Final exam	In-class activities, Lab	
9	Achieving Operational Excellence and Customer Intimacy: Enterprise Applications;	1	Final exam	In-class activities, Lab	
10	Building Information Systems;	2,3	Final exam	In-class activities, Lab	
11	Managing Knowledge;	1	Final exam		
12	Enhancing Decision Making.	1	Final exam		
13	Final exam				

4. Assessment plan

Note: %Pass: Target that % of students having scores greater than 50 out of 100.

Assessment Type	CLO1	CLO2	CLO3
Midterm examination (30%)	40%	30%	20%
Projects/Presentations/ Report (20%)		40%	60%
Final examination (40%)	30%	20%	20%
Exercises/ Quiz (20%)	30%	10%	

Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports

Student:	HW/Assignment:	Evaluator:	Max.	Score	Comments
Technical content (60%)					
Abstract clearly identifies purpose and summarizes principal content	10				
Introduction demonstrates thorough knowledge of relevant background and prior work	15				
Analysis and discussion demonstrate good subject mastery	30				
Summary and conclusions appropriate and complete	5				
Organization (10%)					
Distinct introduction, body, conclusions	5				
Content clearly and logically organized, good transitions	5				
Presentation (20%)					
Correct spelling, grammar, and syntax	10				
Clear and easy to read	10				
Quality of Layout and Graphics (10%)					
TOTAL SCORE	100				

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.

2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
			1
Explanation of issues	Issue/ problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding.	Issue/ problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/ problem to be stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.
Evidence Selecting and using information to investigate a point of view or conclusion	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position. Specific position (perspective, thesis/ hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/ hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/ hypothesis).	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/ hypothesis).	Specific position (perspective, thesis/ hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/ hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone 4	Milestone 3	Milestone 2	Benchmark 1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering

Assoc. Prof. Nguyen Van Sinh



COURSE SYLLABUS

Course Name: Deep Learning

Course Code: IT157IU

1. General information

Course designation	This course helps students understand the capabilities, challenges, and consequences of deep learning and prepare students to participate in the development of leading-edge AI technology
Semester(s) in which the course is taught	7
Person responsible for the course	Dr. Mai Hoang Bao An
Language	English
Relation to curriculum	Elective (CS, DS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	C/C++ Programming Calculus 3 or Linear Algebra
Course objectives	This course helps students understand the capabilities, challenges, and consequences of deep learning and prepare students to participate in the development of leading-edge AI technology. In this course, students will build and train neural network architectures such as Convolutional Neural Networks, Recurrent Neural Networks, Transformers, and learn how to make them better with strategies such as Dropout, BatchNorm, and more. Get ready to master

	<p>theoretical concepts and their industry applications using Python and PyTorch and tackle real-world cases.</p>								
Course learning outcomes	<p>CLO 1. Understand fundamental concepts of Deep Learning. Get familiar with some popular algorithms used in deep learning models. Understand and be able to use of popular libraries such as NumPy, PyTorch.</p> <p>CLO 2. Neural Networks for regression and classification. The concept of Multilayer Perceptrons. The essential networks: Convolutional Neural Networks (CNN), Recurrent Neural Networks (RNN).</p> <p>CLO 3. Build, train, and deploy different types of Deep Architectures from traditional to modern Architectures.</p> <p>CLO 4. Understand and be able to apply deep learning techniques to real-world scenarios: Computer Vision, Natural Language Processing.</p>								
Content	<p><i>The description of the contents should clearly indicate the weighting of the content and the level.</i></p> <p>Weight: lecture session (3 hours)</p> <p>Teaching levels: I (Introduce); T (Teach); U (Utilize)</p> <table border="1"> <thead> <tr> <th>Competency level</th> <th>Course learning outcome (CLO)</th> </tr> </thead> <tbody> <tr> <td>Knowledge</td> <td>CLO 1, CLO 2, CLO 3, CLO 4</td> </tr> <tr> <td>Skill</td> <td>CLO 3, CLO 4</td> </tr> <tr> <td>Attitude</td> <td>CLO 3, CLO 4</td> </tr> </tbody> </table>	Competency level	Course learning outcome (CLO)	Knowledge	CLO 1, CLO 2, CLO 3, CLO 4	Skill	CLO 3, CLO 4	Attitude	CLO 3, CLO 4
Competency level	Course learning outcome (CLO)								
Knowledge	CLO 1, CLO 2, CLO 3, CLO 4								
Skill	CLO 3, CLO 4								
Attitude	CLO 3, CLO 4								

	<ul style="list-style-type: none"> - Long Short-Term Memory (LSTM) - Bidirectional RNN - Encoder-Decoder Architecture 		
Optimization Algorithms used in Deep Learning		1	I, T
Generative Adversarial Network (GAN) & Deep Convolution GAN		1	T, U
Deep Learning in Computer Vision		1	T, U
Deep Learning in Natural Language Processing		1	T, U
Examination forms	Short-answer questions, Long-answer questions, programming questions		
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation.</p> <p>Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>		
Reading list	<p>[1] Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep Learning, The MIT Press 2021, ISBN: 978-0262035613.</p> <p>[2] Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola., Dive Into Deep Learning.</p>		

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	1	2	3	4	5	6
1	x					
2		x	x			
3			x	x	x	
4				x		x

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Introduction to Deep Learning Some demos on the applications of Deep Learning	1		Lecture, Discussion	[1, 2] Chapter 1
2	Linear Classifiers, Optimization and Gradient Descent Backpropagation Algorithm Introduction to PyTorch library	1	Exercises	Lecture, In-class exercises	[1, 2] Chapter 2

3	Linear Neural Networks for Regression Linear Neural Networks for Classification	1, 2	Exercises	Lecture, In-class exercises	[2] Chapter 3, 4
4	Multilayer Perceptrons	2	Exercises	Lecture, In-class exercises	[2] Chapter 5
5	Advances in PyTorch library	1, 2	Exercises	Lecture, In-class exercises	[2] Chapter 6
6	Convolutional Neural Networks (CNN)	2	Exercises	Lecture, In-class exercises	[2] Chapter 7
7	Recurrent Neural Networks (RNN)	2	Quiz	Lecture, In-class quiz	[2] Chapter 9
8-9	Modern CNN: - Networks Using Blocks (VGG) - Multi-Branch Networks (GoogLeNet) - Residual Neural Network (Resnet) - MobileNet	2, 3	Exercises	Lecture, In-class exercises	[2] Chapter 8
10	Midterm				
11-12	Modern RNN: - Gated Recurrent Units (GRU) - Long Short-Term Memory (LSTM) - Bidirectional RNN - Encoder-Decoder Architecture	2, 3	Exercises	Lecture, In-class exercises	[2] Chapter 10
13	Optimization Algorithms used in Deep Learning	1, 4	Seminar	Lecture, Discussion	[2] Chapter 12
14	Generative Adversarial Network (GAN) & Deep Convolution GAN	3, 4	Seminar	Lecture, Discussion	[2] Chapter 18
15	Deep Learning in Computer Vision	4	Seminar	Lecture, Student presentation	[2] Chapter 14
16	Deep Learning in Natural Language Processing	4	Seminar	Lecture, Student presentation	[2] Chapter 15
17	Final exam				

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (5%)	10%		20%	20%
Labs (10%)	30%	30%		

Midterm examination (30%)	50%	40%	
Projects/Presentations/ Report (15%)	10%	30%	30%
Final examination (40%)	30%	50%	50%

5. Rubrics (optional)

5.1. Grading checklist

Grading checklist for Written Reports

Student: HW/Assignment:	Date: Evaluator:	Max.	Score	Comments
Technical content (60%)				
Abstract clearly identifies purpose and summarizes principal content	10			
Introduction demonstrates thorough knowledge of relevant background and prior work	15			
Analysis and discussion demonstrate good subject mastery	30			
Summary and conclusions appropriate and complete	5			
Organization (10%)				
Distinct introduction, body, conclusions	5			
Content clearly and logically organized, good transitions	5			
Presentation (20%)				
Correct spelling, grammar, and syntax	10			
Clear and easy to read	10			
Quality of Layout and Graphics (10%)				
		TOTAL SCORE	100	

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

	Capstone	Milestone	Benchmark
	4	3	1

		Issue/problem to be considered critically is stated clearly and described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplained, boundaries undetermined, and/or backgrounds unknown.
Explanation of issues				
Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>		Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions		Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Shows an emerging awareness of present assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).
Student's position (perspective, thesis/hypothesis)		Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.
Conclusions and related outcomes (implications and consequences)		Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	4	3	Milestone	2	Benchmark	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is intermittently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.

Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling, and speaker appears polished and confident.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting, and speaker appears comfortable.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understandable, and speaker appears tentative.	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and speaker appears uncomfortable.
Supporting Material	A variety of types of supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that significantly supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that generally supports the presentation or establishes the presenter's credibility/ authority on the topic.	Supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that partially supports the presentation or establishes the presenter's credibility/ authority on the topic.	Insufficient supporting materials (explanations, examples, illustrations, statistics, analogies, quotations from relevant authorities) make appropriate reference to information or analysis that minimally supports the presentation or establishes the presenter's credibility/ authority on the topic.
Central Message	Central message is compelling (precisely stated, appropriately repeated, memorable, and strongly supported.)	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not often repeated and is not memorable.	Central message can be deduced but is not explicitly stated in the presentation.

Source: Association of American Colleges and Universities

Date revised: February 15, 2022

Ho Chi Minh City, 15/02/2022
Dean of School of Computer Science and Engineering



Assoc. Prof. Nguyen Van Sinh



VIETNAM NATIONAL UNIVERSITY HCMC
INTERNATIONAL UNIVERSITY
School of Computer Science and Engineering

COURSE SYLLABUS

Course Name: UI Design and Evaluation

Course Code: IT158IU

1. General information

Course designation	This course provides students with fundamental interaction principles between human and computers.
Semester(s) in which the course is taught	7,8
Person responsible for the course	MSc. Dao Tran Hoang Chau
Language	English
Relation to curriculum	Elective (CS)
Teaching methods	Lecture, lesson, project, seminar.
Workload (incl. contact hours, self-study hours)	Total workload: 195 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 45 (lecture) + 30 (laboratory) Private study including examination preparation, specified in hours: 120
Credit points	Number of credits: 4 Lecture: 3 Laboratory: 1
Required and recommended prerequisites for joining the course	None
Course objectives	This course provides students with fundamental interaction principles between human and computers.
Course learning outcomes	CLO 1. Know how to gather requirements. CLO 2 Apply human-computer interaction principles in user interface design process CLO 3 Choose the appropriate interface evaluation method CLO 4. Understand different design principles for mobile applications and the Web.

	Competency level	Course learning outcome (CLO)
Knowledge	2, 3, 4	
Skill	1	
Attitude	1	
<i>The description of the contents should clearly indicate the weighting of the content and the level.</i>		
Weight: lecture session (3 hours)		
Teaching levels: I (Introduce); T (Teach); U (Utilize)		
Topic	Weight	Level
Human factors	1	I
Human perception and cognition principles	2	T
User-centered design	2	T,U
Requirements gathering techniques	1	T,U
Interface design process	2	T,U
Prototyping techniques	2	T,U
Interface evaluation methodology	1	T,U
Interaction styles and techniques	1	T
HCI for mobile applications and the Web	2	T,U
Typography	1	T,U
Examination forms	Short-answer questions	
Study and examination requirements	<p>Attendance: A minimum attendance of 80 percent is compulsory for the class sessions. Students will be assessed on the basis of their class participation. Questions and comments are strongly encouraged.</p> <p>Assignments/Examination: Students must have more than 50/100 points overall to pass this course.</p>	
Reading list	<p>[1] Debbie Stone, Caroline Jarrett, Mark Woodroffe, Shailey Minocha, User Interface Design and Evaluation, 1st Edition, Morgan Kaufmann, 2005</p> <p>[2] Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, Human-Computer Interaction, 3rd Edition, Prentice Hall, 2004</p> <p>[3] Gerard Jounghyun Kim, Human-Computer Interaction, Fundamentals and Practice, CRC Press, 2015</p>	

2. Learning Outcomes Matrix

The relationship between Course Learning Outcomes (CLO) (1-4) and Program/Student Learning Outcomes (SLO) (1-6) is shown in the following table:

	1	2	3	4	5	6
1			x			
2	x			x		
3		x			x	
4		x				

3. Planned learning activities and teaching methods

Week	Topic	CLO	Assessments	Learning activities	Resources
1	Human factors	1	Midterm exam	In-class activities	
2,3	Human perception and cognition principles	2	Midterm exam	In-class activities	
4,5	User-centered design	2	Midterm exam, Project, Lab quiz	In-class activities	
6	Requirements gathering techniques	1	Midterm exam, Project	In-class activities	
7,8	Interface design process	2	Midterm exam, Project	In-class activities	
Midterm exam					
9,10	Prototyping techniques	2	Project	In-class activities	
11	Interface evaluation methodology	3	Final exam, Project	In-class activities	
12	Interaction styles and techniques	3	Final exam	In-class activities	
13,14	HCI for mobile applications and the Web	4	Lab quiz	In-class activities	
15	Typography	2, 4	Final exam, Project	In-class activities	
Final exam					

4. Assessment plan

Assessment Type	CLO1	CLO2	CLO3	CLO4
Quiz (5%)	10%		20%	20%
Labs (10%)	30%	30%		
Midterm examination (30%)	50%	40%		
Projects/Presentations/ Report (15%)	10%		30%	30%
Final examination (40%)		30%	50%	50%

5. Rubrics (optional)

5.1. Grading checklist	Grading checklist for Written Reports

Student:	HW/Assignment:
Date:	Evaluator:
Technical content (60%)	
Abstract clearly identifies purpose and summarizes principal content	10
Introduction demonstrates thorough knowledge of relevant background and prior work	15
Analysis and discussion demonstrate good subject mastery	30
Summary and conclusions appropriate and complete	5
Organization (10%)	
Distinct introduction, body, conclusions	5
Content clearly and logically organized, good transitions	5
Presentation (20%)	
Correct spelling, grammar, and syntax	10
Clear and easy to read	10
Quality of Layout and Graphics (10%)	
TOTAL SCORE	100

5.2. Holistic rubric

Holistic rubric for evaluating the entire document, e.g., exercises/quizzes/HW

Score	Description
5	Demonstrates complete understanding of the problem. All requirements of task are included in response
4	Demonstrates considerable understanding of the problem. All requirements of task are included.
3	Demonstrates partial understanding of the problem. Most requirements of task are included.
2	Demonstrates little understanding of the problem. Many requirements of task are missing.
1	Demonstrates no understanding of the problem.
0	No response/task not attempted

Note: this rubric is also used to evaluate questions in an exam.

5.3. Analytic rubric

Critical thinking value rubric for evaluating questions in exams:

Explanation of issues	Capstone		Milestone	Benchmark
	4	3	2	1
	Issue/problem to be considered critically is stated clearly and described comprehensively, delivering all relevant information necessary for full understanding	Issue/problem to be considered critically is stated, described, and clarified so that understanding is not seriously impeded by omissions.	Issue/problem to be considered critically is stated but description leaves some terms undefined, ambiguities unexplored, boundaries undetermined, and/or backgrounds unknown.	Issue/problem to be considered critically is stated without clarification or description.

Evidence <i>Selecting and using information to investigate a point of view or conclusion</i>	Information is taken from source(s) with enough interpretation/ evaluation to develop a comprehensive analysis or synthesis. Viewpoints of experts are questioned thoroughly.	Information is taken from source(s) with enough interpretation/ evaluation to develop a coherent analysis or synthesis. Viewpoints of experts are subject to questioning.	Information is taken from source(s) with some interpretation/ evaluation, but not enough to develop a coherent analysis or synthesis. Viewpoints of experts are taken as mostly fact, with little questioning.	Information is taken from source(s) with some interpretation/ evaluation from source(s) without any interpretation/ evaluation. Viewpoints of experts are taken as fact, without question.
Influence of context and assumptions	Thoroughly (systematically and methodically) analyzes own and others' assumptions and carefully evaluates the relevance of contexts when presenting a position.	Identifies own and others' assumptions and several relevant contexts when presenting a position.	Questions some assumptions. Identifies several relevant contexts when presenting a position. May be more aware of others' assumptions than one's own (or vice versa).	Shows an emerging awareness of present assumptions (sometimes labels assertions as assumptions). Begins to identify some contexts when presenting a position.
Student's position (perspective, thesis/hypothesis)	Specific position (perspective, thesis/hypothesis) is imaginative, taking into account the complexities of an issue. Limits of position (perspective, thesis/hypothesis) are acknowledged. Others' points of view are synthesized within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) takes into account the complexities of an issue. Others' points of view are acknowledged within position (perspective, thesis/hypothesis).	Specific position (perspective, thesis/hypothesis) acknowledges different sides of an issue.	Specific position (perspective, thesis/hypothesis) is stated, but is simplistic and obvious.
Conclusions and related outcomes (implications and consequences)	Conclusions and related outcomes (consequences and implications) are logical and reflect student's informed evaluation and ability to place evidence and perspectives discussed in priority order.	Conclusion is logically tied to a range of information, including opposing viewpoints; related outcomes (consequences and implications) are identified clearly.	Conclusion is logically tied to information (because information is chosen to fit the desired conclusion); some related outcomes (consequences and implications) are identified clearly.	Conclusion is inconsistently tied to some of the information discussed; related outcomes (consequences and implications) are oversimplified.

Source: Association of American Colleges and Universities

Oral communication value rubric for evaluating presentation tasks:

	Capstone	Milestone	Benchmark	
	4	3	2	1
Organization	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable and is skillful and makes the content of the presentation cohesive.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is clearly and consistently observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is partially observable within the presentation.	Organizational pattern (specific introduction and conclusion, sequenced material within the body, and transitions) is not observable within the presentation.
Language	Language choices are imaginative, memorable, and compelling, and enhance the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are thoughtful and generally support the effectiveness of the presentation. Language in presentation is appropriate to audience.	Language choices are mundane and commonplace and partially support the effectiveness of the presentation. Language in presentation is not appropriate to audience.	Language choices are unclear and minimally support the effectiveness of the presentation. Language in presentation is not appropriate to audience.
Delivery	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understandability of the presentation, and