

COURSE SYLLABUS

I. GENERAL INFORMATION

1. Course title in Vietnamese: **TOÁN RỜI RẠC**
2. Course title in English: **DISCRETE MATHEMATICS**
3. Knowledge / skill categorization:
 - General knowledge
 - Basic knowledge
 - Professional knowledge
 - Specialized knowledge
 - Supplementary knowledge
 - Graduate thesis / thesis
4. Number of credits

Total	Theory	Practices	Self-learning
4	4	0	4 (4, 0, 8)

5. In charge of subject
 - a) Faculty / Department / Sub-Department: Information Technology
 - b) Faculty: Dr. Truong Hoang Vinh
 - c) Contact email: vinh.th@ou.edu.vn
 - d) Address: Room 604. Faculty of Information Technology.
35-37 Hồ Hảo Hớn Street, District1. HCM City

II. COURSE INFORMATION

1. Course description

This course covers several important topics of theory and application of discrete Mathematics. After completing this course, students can acquire the knowledge of discrete mathematics such as logic, proofs, theory of sets, relations, functions, counting and Turing machines with an emphasis on applications in computer science. This course introduces the math's discrete to students that is widely used in computer science. It also presents problem-solving and logical thinking approach for analyzing and solving real-world problems.

2. Course conditions

#	Course conditions	Course code
1.	prerequisite subject	
	None	
2.	Previous subject	
	None	
3.	Parallel subject	
	None	

3. Course objectives (COs)

The course will provide students with ability to:

Course objectives (CO)	Description	Related Program Learning Outcomes (PLO)
CO1 (Knowledge)	<ul style="list-style-type: none"> - Understand the concepts and properties of problems in discrete math theory - Understand the importance and obligations of implementing each problem in applied mathematics in information Technology. 	PO3.4
CO2 (Skills)	<ul style="list-style-type: none"> - Analysis, inference problems logically and systematically. - Demonstrate and model the problem scientifically. - Solve the problem based on discrete mathematics knowledge is provided. 	PO3.4
CO3 (Attitude)	<ul style="list-style-type: none"> - Ability to self-learning, eager to learn. - Recognize the importance and position of discrete math in information Technology industry. 	PO12.3 PO13.3

4. Course learning outcomes (CLOs)

After completing this course, students are able to:

Course objectives (CO)	Course learning outcomes (CLO)	Description
CO1	CLO1.1	Present the concept and properties of problems in discrete math theory.

Course objectives (CO)	Course learning outcomes (CLO)	Description
	CLO1.2	- Presenting the importance and practical significance of all-discrete problems that apply to computer science.
CO2	CLO2.1	- Analyzing and reasoning the problem logically.
	CLO2.2	- Represent and model with discrete mathematical models.
	CLO2.3	- Solve Computer Science problems based on discrete math knowledge.
CO3	CLO3.1	- Know the importance of discrete math in the IT industry.
	CLO3.2	- Improve your ability to think and reason logic.

Matrix of Course Learning Outcomes (CLOs) and Program Learning Outcomes (PLOs):

CLOs	PLO3.4	PLO12.3	PLO13.3
CLO1.1	5		
CLO1.2	5		
CLO2.1	5		
CLO2.2	5		
CLO2.3	5		
CLO3.1		5	
CLO3.2			4

1: Not supported

2: Partially supported

3: Supported

4: Highly supported

5: Totally supported

5. Course materials

a) Textbooks

[1] Edward R. Scheinerman. Mathematics: A Discrete Introduction. Cengage Learning. 2013. [49171]

b) Reference materials

[2] John Vince. Foundation Mathematics for Computer Science: A Visual Approach.

Springer. 2015 [48985]

c) Software

- 1) Java 8 (released 18/03/2014)
- 2) NetBeans IDE 8.2 (released 03/10/2016)
- 3) Gluon Scene Builder 11 (released 05/06/2018)

6. Course assessment

Components	Assessment	Timing	Course learning outcomes (CLO)	Rate (%)
(1)	(2)	(3)	(4)	
A1. Process Evaluation	A.1.1.			0%
	Total:			0%
A2. Mid-term Evaluation	A2.1. Midterm Examination			50%
	Total: 01			50%
A3. End-of-term Evaluation	A3.1. Final Examination			50%
	Total: 01			50%
Total				100%

7. Rubrics

a) Midterm Evaluation Rubric (50%)

CRITERIA	CLO	Weight	Excellent	Good	Satisfactory	Need Improvement
Writing (5 questions)		100% (10 points)	Point/Criteria			
Function	1.1	40%	2.75 – 4.0	2.0 – 2.75	1.25 -2.0	<1.25
Logic	2.1	30%	2.75 – 3.0	2.25 – 2.75	1.25 -2.25	<1.25
Counting	2.2	30%	2.75 – 3.0	2.25 – 2.75	1.25 -2.25	<1.25

b) Final evaluation rubric (50%)

CRITERIA	CLO	Weight	Excellent	Good	Satisfactory	Need Improvement
Writing (5 questions)		100% (10 points)	Point/Criteria			
Function	1.2	20%	1.75 – 2.0	1.25 – 1.75	1.0 -1.25	<1.0
Logic	2.2	20%	1.75 – 2.0	1.25 – 1.75	1.0 -1.25	<1.0
Counting	2.3	20%	1.75 – 2.0	1.25 – 1.75	1.0 -1.25	<1.0
Boole Algebra	2.3	20%	1.75 – 2.0	1.25 – 1.75	1.0 -1.25	<1.0
Graph	3.2	20%	1.75 – 2.0	1.25 – 1.75	1.0 -1.25	<1.0

8. Teaching plan

Teaching plans for theory (4.5 class-time unit per session)

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
1.Week Theory Session 1	1/ Chapter 1. Collection, mapping and relations 1.1. Introduction to set theory. 1.1.1 Definition. 1.1.2 Subset. 1.1.3. Geometric description of set. 1.1.4. Set operation. 1.2. Mapping. 1.2.1. Definition. 1.2.2 Mapping set. 1.2.3. Garthers force	CLO1.1 CLO1.2 CLO2.1 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A2.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			<p>+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes.</p> <p>+ Study at home: watch lectures, summarize key knowledge, learn related knowledge.</p> <p>+On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.</p>		
2.Week 2/ Theory Session 2	<p>Chapter 1: Collection, mapping and relations (continue)</p> <p>1.3. Binary relation</p> <p>1.3.1 Definition</p> <p>1.3.2. Order relation.</p> <p>1.3.3. Equivalence relation</p> <p>1.3.4. Representation</p> <p>1.4. n-relation.</p> <p>1.4.1. Definition.</p> <p>1.4.2. Operations on n-relation</p>	<p>CLO1.1</p> <p>CLO1.2</p> <p>CLO2.1</p> <p>CLO3.1</p> <p>CLO3.2</p>	<p>Teacher:</p> <p>+ Introduction to details outline.</p> <p>+ Lecture</p> <p>+ Ask question, exercises.</p> <p>+ Emphasize the main points.</p> <p>+ Outline the requirements for the next class.</p> <p>Student:</p>	A2.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
3.Week Theory Session 3	3/ Chapter 2. Logic 2.1. Propositional logic. 2.1.1. Definition. 2.1.2. Operations. 2.1.3. Rules of deduction 2.2. Predicate logic. 2.2.1. Definition 2.2.2. Amount of words 2.2.3. Rules of inference with word quantity... 2.3. Proof. 2.3.1. Prove directly... 2.3.2. Indirect	CLO1.1 CLO1.2 CLO2.2 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A2.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
	proof		+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
4. Week 4/ Theory Session 4	Chapter 3. Counting theory 3.1. The fundamental of counting. 3.1.1. Basic principles. 3.1.2. Compensation principle. 3.2. The Pigeonhole principle. 3.2.1 Introduction. 3.2.2. The Dirichlet Principle. 3.2.3. Application.	CLO1.1 CLO1.2 CLO2.3 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A2.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			<p>+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes.</p> <p>+ Study at home: watch lectures, summarize key knowledge, learn related knowledge.</p> <p>+On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.</p>		
5. Week 5/ Theory Session 5	<p>Chapter 3. Counting theory (continue) 3.3. Combinatorics, Arrangement, Permutation. 3.3.1. Arrangement. 3.3.2. Combinatorics 3.3.3. Permutation. 3.3.4. Newton's system 3.4. Correction and broad analogy combination. 3.4.1. Correction loop</p>		<p>Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class.</p> <p>Student:</p>	A2.1	[1][2][3]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
	3.4.2. Combinatoric repeats 3.4.3 Loop permutation.		+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
6. Week 6/ Theory Session 6	Chapter 4. Regression coefficient 4.1 Definition. 4.1.1. Define the retrieval coefficient. 4.1.2. Solution of the regression coefficient 4.2. Solve the problem with the model of regression.	CLO1.1 CLO1.2 CLO2.3 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A2.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			<p>+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes.</p> <p>+ Study at home: watch lectures, summarize key knowledge, learn related knowledge.</p> <p>+On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.</p>		
7. Week 7/ Theory Session 7	<p>Chapter 4. Regression coefficient (continue)</p> <p>4.3. Solve the retrieval coefficients.</p> <p>4.3.1. Homogeneous linear regression system</p> <p>4.3.2.Retrieval relation League level 2, level 3.</p>	<p>CLO1.1 CLO1.2 CLO2.3 CLO3.1 CLO3.2</p>	<p>Teacher:</p> <p>+ Introduction to details outline.</p> <p>+ Lecture</p> <p>+ Ask question, exercises.</p> <p>+ Emphasize the main points.</p> <p>+ Outline the requirements for the next class.</p> <p>Student:</p>	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
8. Week 8/ Theory Session 8	Chapter 5: Boolean Algebra 5.1. Definition. 5.1.1 Definition of Boolean algebra. 5.1.2. Properties. 5.2. Boolean function.. 5.2.1. Definition 5.2.2. Performance. 5.2.3. Logic gate	CLO1.1 CLO1.2 CLO2.2 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			<p>+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes.</p> <p>+ Study at home: watch lectures, summarize key knowledge, learn related knowledge.</p> <p>+On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.</p>		
9. Week 9/ Theory Session 9	<p>Chapter 5: Boolean Algebra (continue)</p> <p>5.3. Minimization of Boolean functions.</p> <p>5.3.1. Definition.</p> <p>5.3.2. Variable method.</p> <p>5.3.3. Karnaugh map</p>	<p>CLO1.1</p> <p>CLO1.2</p> <p>CLO2.2</p> <p>CLO3.1</p> <p>CLO3.2</p>	<p>Teacher:</p> <p>+ Introduction to details outline.</p> <p>+ Lecture</p> <p>+ Ask question, exercises.</p> <p>+ Emphasize the main points.</p> <p>+ Outline the requirements for the next class.</p> <p>Student:</p>	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
10. Week 10/ Theory Session 10	Chapter 6. Graph theory 6.1. Basic concepts of graphs. 6.1.1. Undirected & directed graph. 6.1.2. Graphical representation. 6.1.3. Some special graphs.	CLO1.1 CLO1.2 CLO2.2 CLO2.3 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			<p>+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes.</p> <p>+ Study at home: watch lectures, summarize key knowledge, learn related knowledge.</p> <p>+On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.</p>		
11. Week 11/ Theory Session 11	<p>Chapter 6. Graph theory</p> <p>6.2. Planar graph, and not flat.</p> <p>6.2.1. Subgraph and bi-partie graph.</p> <p>6.2.2. Planar graph and properties..</p> <p>6.2.3. Euler's cycle and Hamiltonian cycle.</p>	<p>CLO1.1</p> <p>CLO1.2</p> <p>CLO2.2</p> <p>CLO2.3</p> <p>CLO3.1</p> <p>CLO3.2</p>	<p>Teacher:</p> <p>+ Introduction to details outline.</p> <p>+ Lecture</p> <p>+ Ask question, exercises.</p> <p>+ Emphasize the main points.</p> <p>+ Outline the requirements for the next class.</p> <p>Student:</p>	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
12. Week 12/ Theory Session 12	Chapter 6. Graph theory(continue) 6.3. Tree and forest. 6.3.1. Definition 6.3.2. Prufer encryption. 6.3.3. Minimal spanning tree.	CLO1.1 CLO1.2 CLO2.2 CLO2.3 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
13. Week 13/ Theory Session 13	Chapter 6. Graph theory (continue) 6.4. Math problems 6.4.1. Shortest path problem. 6.4.2 Graph coloring.	CLO1.1 CLO1.2 CLO2.3 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		
14. Week 14/ Theory Session 14	Practice	CLO1.1 CLO1.2 CLO2.3 CLO3.1 CLO3.2	Teacher: + Introduction to details outline. + Lecture + Ask question, exercises. + Emphasize the main points. + Outline the requirements for the next class. Student:	A3.1	[1][2]

Week/session	Content	CLO	Teaching and learning activities	Reviews / Assessment	Main documents and references
(1)	(2)	(3)	(4)	(5)	(6)
			+ Learning in class: listening to lectures, answering question, solving the posed exercises, taking notes. + Study at home: watch lectures, summarize key knowledge, learn related knowledge. +On LMS system: answer theoretical mutiple-choice questions, participate in discussion on forums.		

9. Course regulations

- Students participate fully in theory and practice sessions.
- Students must submit large assignments through the LMS and participate in question-and-answer sessions.

DEAN OF FACULTY

(Sign and specify full name)

Dr. Le Xuan Truong

EDITOR

(Sign and specify full name)

Dr. Truong Hoang Vinh