

**COURSE SYLLABUS
FOR FULL-TIME UNDERGRADUATE PROGRAMS**

(Issued under Decision No.1380/QĐ-ĐHKTQĐ on 15/8/2016 by the University President)

1. COURSE NAME: Applied Mathematical Models

Code: TOKT1122

Number of Credit: 03

2. DEPARTMENT IN CHARGE OF INSTRUCTION

Office: Faculty of Mathematics for Economics

Office Hours: Working hours, the working day

Office Telephone: 084 38263007

3. PRE-REQUISITE

Theory mathematical model; Optimization 2

4. COURSE DESCRIPTION

This is the next module of the subject of economic theory mathematical model with specific model classes. Set the layer algorithms operating operational problems. Use the powerful tool the layers of optimization problems with continuous conditions and discursive. Gamsid specialized software will be introduced not only for the problems in this module, but also for general economic problems.

Model classes will be equipped with :

- Graph theory and PERT (network diagram method) studies: basic concepts of the theory of planar graphs, the graph problems, transportation problems on the network, construction methods network diagram with time targets, the optimization problem on the network diagram, use of the POM, Gams software solving problems of network diagrams and online transportation theory.
- The model queue: The theoretical basis and modeling methods, application scope. General approaches for solving problems of public service. Classes specific model and solution method. Using POM, Excel, Gams to write programs to address math classes.

- Reserve theoretical model: studies modeling all operational reserve from the classic model. League static models and analysis of common situations. Solving static problems and analyze the results. Use Gamsid to solve reserve model classes.

5. COURSE OBJECTIVES

Students should be able to:

- Understand how modeling several specific economic problems in the corresponding model class.
- Understand the methods to find solutions in specific situations and make good use of free softwares, especially Gamsid to solve problems.
- Be familiar with the exploitation of the non-standard situations of models and solution approaches.

6. COURSE CONTENTS

TENTATIVE SCHEDULE

<i>No</i>	<i>Contents</i>	<i>Total hours</i>	<i>In details</i>		<i>Notes</i>
			<i>Theory</i>	<i>Practice, Discussion, Exams</i>	
1	Chapter 1	13	8	5	<i>Students need to practice more on the computer</i>
2	Chapter 2	15	10	5	
3	Chapter 3	17	10	6+1	
	Total	45	28	17	

CHAPTER 1– SUMMARY THEORY CHART AND METHODS MAP NETWORK (PERT)

This chapter provides a brief introduction to the finite graph theory and applications of this theory in a number of practical classes of problems. The models applying the graph theory introduced include the way; Maximum flow problem; transportation theory and methodology online network diagram (PERT). The content of the theory is only descriptive. The problem is specifically designed with the support of the specialized software POM, Gamsid. With this structure learners can apply the theory and find the solution of problems through the program built on Gamsid.

1.1 Summary graph theory

1.1.1. Finite Graphs

1.1.2. Forests and trees

1.1.3. Problem path

1.1.4. Transport network

Get familiar with the established program Gamsid and solve maximum network

1.2. Network diagram method

1.2.1. Network diagram

1.2.2. The target time on the network diagram

1.2.3. Gantl diagrams and PERT diagram horizontal (reference)

1.2.4. Optimization problem

1.3. Practice, exercise

References of the chapter:

1 - Ngo Van Thu, 2005, the application of mathematical models (for Specialized Economic Mathematics), Science and Technology Publishing House, Chapter 1.

2 - Hoang Dinh Tuan, 2006, the model theory for economics majors Mathematics, Science & Technology Publishing House.

3 - @GAMS Development Corporation, 12/1998, a user's guide Gams.

CHAPTER 2 - THEORY MODEL QUEUES

This chapter introduces a layer of control problem with a new approach for analysis methods of simple random systems. Mathematical modeling queues has a wide range of specific applications that are considered relatively complete with the support of dedicated softwares. The author of the textbook also provides a program on Gamsid system to mitigate the specific calculation of learners. Many real-life situations are modeled and solved.

2.1. Queues system model

2.1.1. Theoretical problems of queues

2.1.2. Queues systems and elements

2.1.3. The nature of a request line Poisson and stationary Poisson

2.1.4. Hypothesis Test about Poisson Distribution

2.2 System status, process transition

2.2.1. Methods of analysis

2.2.2. Classification System

2.2.3. System status and status transitions

2.2.4. The process of destruction and birth - the solution of state equations

2.3. Some systems Poisson stop

- 2.3.1. Queue system refused classic (System Eclang)
 - 2.3.2. System serial Eclang
 - 2.3.3. The system refused to yield the distribution channel
 - 2.3.4. Public service system homogeneous wait
 - 2.3.5. System waiting queue length is limited, unlimited timeout
 - 2.3.6. The model determined the optimal place to wait for a timeout waiting for unlimited and limited number of seats awaiting
 - 2.3.7. The system serves the segment
 - 2.4. Some queues system does not stop Poisson
 - 2.4.1. Queues system to station the flow into cyclical
 - 2.4.2. Systems with flow depends on the quality of service
- EXCEL, POM, MH4 and Gamsid with public service models

References of the chapter:

- 1 - Ngo Van Thu, 2005, the application of mathematical models (for Specialized Economic Mathematics), Science and Technology Publishing House, Chapter 2.
- 2 - Hoang Dinh Tuan, 2006, the model theory for economics majors Mathematics, Science & Technology Publishing House.
- 3 - @GAMS Development Corporation, 12/1998, a user's guide Gams.

CHAPTER 3 - MODEL MANGEMENT RESERVE

Management reserve system is one of the many application systems operational. In this chapter, in addition to presenting the classic reserve system, the content of analysis is given attention and fully implemented. System expansion models also contribute to the theory closer to reality than business administration. Some theoretical results are completed to assist in solving problems. The help of the program on a content Gamsid is important in all classes of problems presented in this chapter.

- 3.1. The problem of the concepts and approaches
 - 3.1.1. Problem reserve
 - 3.1.2. Basic concepts
 - 3.1.3. Classification of models and approaches
- 3.2. The deterministic model reserves
 - 3.2.1. Gradually added and regularly consumed reserve model (Willson)
 - 3.2.2. Some models extended from Wilson model
 - 3.2.3. Gradually added and regularly consumed Model reserves
 - 3.2.4. Reserve model price changes over bids
- 3.3. The random storage model
 - 3.3.1. Model reserves a stage
 - 3.3.2. Model insurance reserves

- 3.3.3. Reserve model semi-finished products
- 3.3.4. Reserve model with goods self-destruct
- 3.4. The reserve model with bonds
 - 3.4.1. Models with the quantity and unit price changing over the period
 - 3.4.2. Reserve models with a bound cargo
 - 3.4.3. Reserve problems with many kinds of constraints
 - 3.4.4. Models with wide range of storage needs with limited random warehouse
 - 3.4.5. Constraint model warehouse storage cost and the selling price

References of the chapter:

- 1 - Ngo Van Thu, 2005, the application of mathematical models (for Specialized Economic Mathematics), Science and Technology Publishing House, Chapter 3.
- 2 - Hoang Dinh Tuan, 2006, the model theory for economics majors Mathematics, Science & Technology Publishing House.
- 3 - @GAMS Development Corporation, 12/1998, a user's guide Gams.

7. REQUIRED TEXTBOOKS & COURSE MATERIALS

Ngo Van Thu, 2005, the application of mathematical models (for Specialized Economic Mathematics), Science and Technology Publishing House.

8. RECOMMENDED TEXTS & OTHER READINGS

- 1 - Hoang Dinh Tuan, 2006, the model theory for economics majors Mathematics, Science & Technology Publishing House.
- 2 - @GAMS Development Corporation, 12/1998, a user's guide Gams.

9. ASSESSMENT & GRADING POLICY

- Scale (point) : 10
- Structure of points:
 - + Discussion point: 10%
 - + The exercise, check out: 30%
 - + The final examination period: 60%
- Conditions of the final exam:
 - + Must attend at least 80% of the course

Hanoi, 2016

HEAD OF DEPARTMENT

PRESIDENT

(signed)

(signed)

PhD. Nguyen Manh The

Prof.Dr. Tran Tho Dat