Subject code	ECTS credits
MAT5001	6

Course title in Lithuanian

EILIŲ TEORIJA

Course title in English

## **QUEUING THEORY**

## Short course annotation in Lithuanian (up to 500 characters)

Įgyjamos teorinės ir praktinės žinos apie eilių modelius ir jų parametrų vertinimą bei optimizavimą. Analizuojant konkrečius atvejus, suformuojami įgūdžiai taikyti eilių teoriją įvairiose praktinėse srityse.

Short course annotation in English (up to 500 characters)

Acquired deeper theoretical and practical knowledge of queuing models and evaluation of its parameters and optimization. The analysis of particular cases forms skills to apply queuing theory in various practical areas.

## Prerequisites for entering the course

Probability Theory, Mathematical Statistics

Course aim

Course aim is to provide deeper knowledge of queuing theory and its application.

Links between course outcomes, criteria of learning achievement evaluation, study methods and methods of learning achievement assessment

No	Course outcomes	Criteria of learning achievement evaluation	Study methods	Methods of learning achievement assessment
1	Theoretical knowledge of mathematical models in queuing theory.	Student knows the general notions, theoretical assumptions and results.	Lectures, practical works, individual work, consulting	Mid-term exam, Assessment of practical work
2	Ability to develop mathematical models and estimate its parameters for a particular queuing.	Student knows ability to develop mathematical models and estimate main parameters (mean waiting time, mean response time, etc.) for a particular queuing.	Lectures, practical works, individual work, consulting	Mid-term exam, Assessment of practical work
3	Ability to perform analysis of a particular queuing system (case study analysis), to estimate main parameters and to develop correspondent queuing system based on related statistical data.	Student demonstrates the ability to formulate task, gather needed statistical data and perform its analysis, present solution process, justify received results, present research work.	Lectures, practical works, individual work, consulting	Final exam, assessment of practical work

## Links between study programme outcomes and course outcomes

Study programma autoomag	Running number of course outcome			
Study programme outcomes	1	2	3	
1. Deepen and expand general knowledge of mathematics and apply it in a new non-standard environment	+	+	+	
3. Broaden and apply the knowledge of reliability analysis and statistical methods for data analysis	+	+	+	
4. Identify, select and understand the state-of-the-art literature of mathematics and apply the gained knowledge to specific scientific and practical tasks	+		+	
5. Develop mathematical models integrating the knowledge from various fields and different mathematical modelling techniques, and analyse the modelling results assessing the model adequacy and accuracy		+	+	

7. Analyse, understand and use mathematical methods						+	+	+	
9. Critically evaluate personal results and professional experience								1	
and o	d other persons' activity							+	
12. N	Aake decision	ns independ	ently				+		
13. T	Take moral responsibility for the results of work							+	
Conte	Content								
No				Conter	nt (topics)				
1.	Flow mo	dels.							
2.	Birth and	Birth and death processes.							
3.	Queuing	system basi	ic characteris	stic's calculation	s.				
4.	Theoretical study of waiting lines.								
5.	Multiple	Multiple channel queuing models.							
6.	Erlang di	stribution a	nd its applic	ations.					
7.	Stage me	thod.							
8.	Queuing	systems wi	th any servic	e time distributi	on.				
9.	Marked N	Aarkov pro	cesses.						
10.	Queuing	systems wi	th any input	time distribution	l <b>.</b>				
11.	Group ma	arking meth	nod.						
12.	General of	lueuing the	ory.						
13.	Kingman	's queuing	algebra.						
Distri	bution of wo	orkload for	students (c	ontact and inde	pendent wor	rk hours)			
Lect	ures		45 hours						
Prac	tical work		15 hours						
Indiv	vidual stude	nts work	100 hours						
		Total:	160 hours						
Struct	ture of cumu	lative scor	e and value	of its constitue	nt parts				
Final written exam (50%), mid-term written exam (25%), assessment of practical work (25%).									
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3.	1961	Хинчин А.Я. Математические методы теории массового обслуживания (Mathematical methods of queuing theory)	Изд. АН, Москва	
Course programme designed by				
Prof.	habil. dr. Ju	ozas Augutis		