Subject code	ECTS credits
INF2014	4

Course title in Lithuanian

C# IR DUOMENŲ STRUKTŪROS

Course title in English

C# and DATA STRUCTURES

Short course annotation in Lithuanian (up to 500 characters)

Dalykas suteikia studentams žinias apie virtualių mašinų koncepciją, dotNet platformą ir programavimo aukštesniame abstrakcijos lygmenyje metus ir priemones. Nagrinėjami pagalbinių bibliotekų parengimo ir naudojimo taikomosiose programose principai, analizuojami tinkamų instrumentinių priemonių parinkimo taikomiesiems uždaviniams principai. Pagrindinis dėmesys skiriamas aukštesnio loginio lygmens programavimo priemonių naudojimui: bendriniams rinkiniams, iteratoriams, išplėtimo metodams, žinynams, aibių klasėms, užklausų parengimui naudojant delegatus ir predikatus, įvykių ir kritinių situacijų apdorojimui, įvykių valdomų programų parengimui.

Short course annotation in English (up to 500 characters)

Course provides a knowledge conception of virtual machines, doNet framework and programming methodology in higher abstraction level using C# language. Students are going to learn the main principles and tools for design of dll (Dynamic Linked Libraries) libraries and using them in building Console and Windows applications. They will be able to select and to use proper tools for solving actual problems. The main attention is concentrated on working with higher logical level programming tools: generic collections, iterators, extension methods, dictionaries, data sets, queries using delegates and predicates, handling exceptions and events, design of event driven programs.

Prerequisites for entering the course

Programming Fundamentals, Object Oriented Programming

Course aim

Knowledge of modern programming tools and technologies, ability to use them for solving actual problems.

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	Knowledge about virtual machines conception, dotNet framework and tools for development of application programs.	Student demonstrates the ability to analyze structure and goals of virtual machines, doNet framework and tools for development of application programs.	Lectures, consultations, activity in computer classes.	The student recognizes and identifies at least half of the most important concepts.
2	Define problem formally, choose programming tools and data models for solving them.	Student is able to formalize real-problem, choose suitable data models and programming tools and use them to develop straightforward programming projects.	Lectures, consultations, practical development of projects.	The student describes at least half of popular programming tools and data models, is able to use them in simple projects.
3	Ability to apply popular generic collections for development data models and to use them in application programs.	Student demonstrates knowledge of popular generic collections and get skills in use them in application programs...	Lectures, consultations, practical development of .projects.	The student recognizes and identifies different generic collections, is able to use them in simple projects.

4	Knowledge of main tools for development of new data structures (classes), and ability to apply them to requirements of real projects.	Skills of building dll (Dynamic Linked Libraries) libraries with user defined data structures (classes) and using them in application programs.	Lectures, consultations, practical development of projects.	The student is able to describe and explain the main properties of classes and tools for their modernization.
5	Knowledge of main tools for development of specialized generic collections (Binary Trees, Dictionaries and Sets), ability to use them in solving real problems.	Skills of building of specialized generic collections and ability to use them in solving real problems.	Lectures, consultations, development and presenta-tion of projects.	The student is able to describe and explain the main tools for design of specialized generic collections and to give simple examples of using them.
6	Knowledge about structure of event driven programs and tools for building such programs.	Ability to analyze the structure of event driven programs and ability to build GUI for Windows programs using event handlers.	The student is able to describe and explain the main properties of classes and tools for their modernization.	The student is able to describe and explain the structure of event driven programs and use event handlers for building simple GUI for Windows programs.

Links between study programme outcomes and course outcomes

Study programme outcomes	**Running number of course outcome**					
	1	**2**	**3**	**4**	**5**	**6**
Know and comprehend the needs and importance of information technologies in study process, also be able to apply programming knowledge and skills, data structures and modelling	+			+		
Identify the problem, collect and analyze real/theoretical data using various mathematical methods, tools and IT technologies		+	+			
Think logically and analytically, evaluate alternative ways of task solving and implement optimal solutions				+		
Clearly and convincingly present problems and solutions, related to economics, energetics, biomedicine and didactics, to experts and non-experts using ground knowledge, reasoning, relevant presentation tools and methods					+	+

Content

No	**Content (topics)**
1.	Conception of virtual machines and dotNet framework, Common Language Infrastructure (CLI) and internal CLI data structures and C# language. Value types, reverence types and Literals
2.	Objected-oriented structure of C# programs. Visual Studio System for development of C# programs. Project types and templates. Building Console Application projects for manipulation with texts and streams of numbers.
3.	Building and using auxiliary methods, Value type and reference type parameters for methods, return of method results. Problem of type converting. Convert class and Parse methods. Exception handling and exception classes.

4.	Multidimensional arrays and arrays of arrays. Static and dynamic arrays and Lists. Data search and aggregate operations in Arrays and Lists. Delegates, anonymous methods and lambda expressions. Using methods with delegate type parameters.
5.	User classes and class families: encapsulation, polymorphism and inheritance, interfaces and extension methods.
6.	Main tools for development of specialized generic collections (Binary Trees, Dictionaries, Set Classes) and using them in solving real problems.
7.	Designing and using queries for data collections. Integrated LINQ language and query expressions.
8	Event driven programming tools: events and event handlers, event senders and event listeners. Event driven programming of graphic user interfaces (GUI).

Distribution of workload for students (contact and independent work hours)

Lectures	**30**
Laboratory work	**30**
Individual students work	**60**
Total:	**120**

Structure of cumulative score and value of its constituent parts

Final written exam (50%), mid-term written exam (17%), and assessments of laboratory (practical) work (33%).

Recommended reference materials

No	**Authors and titles**	**Number of copies available**		
		in the Library of VMU	*in specialized publication collections at VMU*	*in other libraries*
	Basic materials			
1.	C# Algorithms and Data Structures. http://msdn.microsoft.com/en-us/vcsharp/aa336800.aspx			Internet
2.	C# Tutorial. http://www.devhood.com/training_modules			Internet
3.	C# Programming Guide. http://msdn.microsoft.com/en-us/library/67ef8sbd.aspx			Internet
4	Troelsen N. Pro C# 2010 and the .NET 4.5. Springer, 2012		1	2
	Supplementary materials			
1.	C# Practical Learning. http://www.functionx.com/csharp/index.htm			
2.	A. Freeman, M.MacDonald, M.Szpuszta. Pro ASP.Net 4.5 in C#. Apress, 2012	1		

Course programme designed by

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