Subject code	Credits
INF4027	3

Title

INTERNETO SISTEMŲ PROGRAMAVIMAS

Title in English

INTERNET SYSTEM PROGRAMMING

Subject goal and annotation

The course provides in-depth coverage of object-oriented programming principles and techniques using Java programming language. It aims to provide students with a practical set of skills for the development of usable, reliable and maintainable internet systems based on up to date multimedia technologies. The content includes: exceptions; Java I/O system; regular expressions; collections API; generics; threads; Java GUI; applets; processing XML with Java; networking. The course structure consists of lectures, laboratory works in computer classroom, as well as individual work.

Prerequisites

Demonstrate familiarity with basic programming concepts.

Relationship between the learning outcomes of the Programme and learning outcomes of the subject

Learning outcomes of the Programme	Learning outcomes of the subject	Criteria for measuring the achievement of learning outcomes
3. Knowledge of basic and advanced computer science and its application.	Knowledge and understanding of objectoriented programming principles and techniques using Java programming language.	Student demonstrates the ability to formulate the principles of data abstraction, encapsulation, inheritance and polymorphism, list the common exceptions and characterise them, outline the key collections interfaces and classes, reasoning the correct use cases of Java I/O system.
6. Knowledge of Internet and multimedia products development, their commercial and social impact.	Choose and apply Java software development tools and technologies meeting the business requirements.	Student demonstrates the ability to apply the Model–View–Controller design pattern, master regular expressions for Java text processing, perform basic Java XML processing operations, choose and apply graphical components for Java applets and client/server applications.
8. Perform interdisciplinary research and development in Internet systems area, apply results in practical applications.	Ability to perform interdisciplinary research and development in Internet systems area, apply results in prototyping moderately complex internet system to deliver the multimedia content.	Student demonstrates skills in analysis of applets security politics, development of TCP and UDP client/server applications transferring the multimedia content, and analysis, design and development of advanced Internet system Java GUI.

	10. Analysis, design and development of advanced Internet systems.	Team-oriented project on analysis, design and development of advanced Internet system. Presenting results.	Student demonstrates skills in implementation of Java SSL client/server application, mastering the NetBeans IDE tool, signing of applets, and development of applets delivering the up to date multimedia content. Students perform analysis, design and development of advanced Internet system and present results to their colleagues and lecturer.

Subject content

	Lecture topics and contents	Hours
1.	**Objects and classes**: The concept of class and interface. Data abstraction. Encapsulation. Inheritance and polymorphism. Constructors. Designing with inheritance. Java language fundamentals.	1
2.	**Object orientation**: Composition and inheritance. Method-call binding. Overriding vs. overloading. Static variables and methods. Coupling and cohesion.	1
3.	**Object class. Reflection. Garbage collector**: Methods of the Object class. Overriding the methods of the Object class. Methods of the Class class. Interaction with garbage collector.	1
4.	**Project development**: Compiling with javac. Launching applications with java. Packages and searching. JAR files. Documenting classes.	1
5.	**Exceptions and Assertions**: Exception hierarchy. Propagating and catching an exception. Common exceptions and errors. Working with the assertion mechanism.	1
6.	**Java I/O system**: The file system and File class. Working with files and directories. Creating and processing stream classes. Serialization.	1
7.	**Java text processing**: The String, StringBuffer and StringBuilder classes. Dates, numbers and currency. Parsing, tokenizing and formatting. Regular expressions.	1
8.	**Collections**: Key interfaces: Collection, List, Queue, Set, Map, SortedSet, SortedMap. Key classes: ArrayList, Vector, LinkedList, HashSet, LinkedHashSet, TreeSet, HashMap, Hashtable, TreeMap, LinkedHashMap, PriorityQueue. Utilities: Collections, Arrays.	1
9.	**Threads**: Defining, instantiating, and starting threads. Thread states and transitions. Synchronizing code. Threads interaction.	1
10.	**Swing**: The Swing class hierarchy. The standard Swing components and layout managers. Building complex layouts with layout manager BoxLayout and container Box.	1
11.	**Java GUI**: The event-handling model. Inner classes. Adding threading with worker threads SwingWorker<T,V>. The Model–View–Controller design pattern.	1
12.	**Applets**: Understanding applets. Methods of the JApplet class. Creating an HTML page for an applet. Graphics. Creating an animation loop with Timer. Applets security politics; Signed applets; Certificates.	1
13.	**Processing XML with Java**: Parsing XML. Building XML documents and performing XML transformations.	1
14.	**Java client/server applications**: Reading from and writing to a socket; adding threading to a server. Creating a TCP/IP client and server with GUI.	1
15.	**Java SSL client/server applications**: SSL protocol; Server and client SSL sockets; Client authentication; SSL sessions.	1
	Total	**15**

Practical work contents

Creation of Java applications that leverage the object-oriented features: encapsulation, inheritance, polymorphism, and composition. Mastering the Java I/O system, collections, generics, concurrent programming, Java graphical user interfaces programming, applets, XML documents processing, networking, and NetBeans IDE. Team-oriented project on prototyping moderately complex internet system to deliver the multimedia content.

Evaluation of study results

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

Distribution of subject study hours

Lectures	15
Laboratory work	30
Individual studies (including studies in groups, preparation for the mid-term and final exams)	37
Total	**82**

Recommended literature

No	Authors of publication and title	Number of copies available		
		in the Library of VMU	*in specialized publication collections at VMU*	*in other libraries*
Basic materials				
1.	A. Deveikis. Objektinis programavimas Java kalba. VDU. 2008.	17	1	
2.	S. A. Goldman and K. Goldman. A practical guide to data structures and algorithms using Java. Chapman &Hall/CRC. 2008.	1		
3.	L.Gony, G. Ellison and M. Dageford. Inside Java 2 Platform security, 2nd ed. Addison-Wesley. 2003.	1		
Supplementary materials				
1.	P.J. Deitel, H.M. Deitel and A. Deitel. Android how to program. Pearson. 2013.	1		
2.	The Java SE7 tutorial	docs.oracle.com/javase/tutorial		

Subject prepared and coordinated by

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