SYLLABUS
2024-2025
Advanced Programming Techniques

1. Information on academic programme

1.1. University	**„1 Decembrie 1918" of Alba Iulia**
1.2. Faculty	**Faculty of Computer Science and Engeneering**
1.3. Department	Department of Computer Science, Matematics and Applied Electronics / Departamentul de Informatica, Matematica si Electronica
1.4. Field of Study	**Computer Science**
1.5. Cycle of Study	Bachelor
1.6. Academic program / Qualification	**Computer Science, 2511/ Systems Analyst, 2512/ Software developers** **Analyst 251201** **Computer System Programmer 251204** **Computer System Engineer 251203**

2. Information of Course Matter

2.1. **Course**	*Advanced programming techniques*			2.2. **Code**		CSE 213	
2.3. **Course Leader**			Kadar Manuella				
2.4. **Seminar Tutor**			Kadar Manuella				
2.5. Academic Year	**II**	2.6. Semester	**II**	2.7. Type of Evaluation (E – final exam/ CE - colloquy examination / CA -continuous assessment)	**CE**	2.8. Type of course (**C**– Compulsory, **Op** – optional, **F** - Facultative)	**C**

3. Course Structure (Weekly number of hours)

3.1. Weekly number of hours	***4***	3.2. course	***2***	3.3. seminar, laboratory	***2***
3.4. Total number of hours in the curriculum	***56***	3.5. course	***28***	3.6. seminar, laboratory	***28***
Allocation of time:					Hours
Individual study of readers					***20***
Documentation (library)					***14***
Home assignments, Essays, Portfolios					***8***
Tutorials					**-**
Assessment (examinations)					***2***
Other activities…….					**-**

3.7 Total number of hours for individual study	44
3.8 Total number of hours in the curriculum	56
3.9 Total number of hours per semester	100
3.10umber of ECTS	4

4.Prerequisites (*where applicable*)

4.1. curriculum-based	***Object-oriented programming***
4.2. competence-based	***C1. Programming in high-level languages*** C1.1 The appropriate description of programming paradigms and of specific language mechanisms, as well as the identification of differences between semantic and syntactic aspects. C1.2 The explaining of existing software applications using different abstraction layers (architecture, packages, classes, methods), correctly using base knowledge. C1.3 The development of correct source codes and the testing of various components in a known programming language, given a set of design specifications.

5. **Requisites** (*where applicable*)

5.1. course-related	Room equipped with video projector / boar
5.2. seminar/laboratory-based	*Laboratory – computers, Software: JDK 6.0, Netbeans 7.0, Internet access.*

6. **Specific competences to be aquired (chosen by the course leader from the programme general competences grid)**

Professional competences	***C1. Programming in high-level languages*** C1.1 The appropriate description of programming paradigms and of specific language mechanisms, as well as the identification of differences between semantic and syntactic aspects. C1.2 The explaining of existing software applications using different abstraction layers (architecture, packages, classes, methods), correctly using base knowledge. C1.3 The development of correct source codes and the testing of various components in a known programming language, given a set of design specifications. ***C2. Development and maintenance of computer applications*** C2.1 The identification of appropriate methodologies for software systems development. C2.2 The identification and explanation of appropriate mechanisms for software systems specification. C2.3 The use of methodologies, specification mechanisms and development environments for the development of computer applications.
Transversal competences	

7. Course objectives (as per the programme specific competences grid)

7.1 General objectives of the course	Advanced programming in Java covers programming for both single system software distribution and across networks/devices. The course provides in depth coverage of object serialization, Java Beans, Servlets, Java Server pages JSP, Java Server Faces JSF, networking, remote objects (RMI), and distributed computing through Jini. The course offers many examples and applications that will be implemented within labs.
7.2 Specific objectives of the course	Students will understand the advanced topics in Java programming, they will be in a position to do commercial Java development both for single services and for distributed processes across multiple devices.

8. Course contents

8.1 Course (learning units)	**Teaching methods**	**Remarks**
1. Introduction to advanced programming techniques. Divide et Impera programming technique. Dynamic programming technique. Branch and Bound technique. Greedy technique. Backtracking technique.	***Lecture, conversation, exemplification***	2h
2. Advanced programming techniques. Sorting algorithms. Multiple execution threads. Input-output streams. Serializing data.	***Lecture, conversation, exemplification***	2h
3. Introduction to Java programming language. History and characteristics of Java programming language. Portability and security of Java programmes execution. Java data types.	***Lecture, conversation, exemplification***	2h
4. Java versus C++. Java versus .Net. Object-oriented programming. Classes and objects; namespaces and packages. Creating and destroying objects.	***Lecture, conversation, exemplification***	2h
5. Inheritance and class hierarchy. Abstract classes and interfaces. Exception handling	***Lecture, conversation, exemplification***	2h
6. Java graphical interface (AWT and Swing). Graphical components: containers and controls. Managing the position of a graphical component	***Lecture, conversation, exemplification***	2h
7. Java Graphical User Interface (AWT and Swing). Listening and handling events generated by graphical components. Graphical contexts and drawing area (canvas).	***Lecture, conversation, exemplification***	2h
8. Java Graphical User Interface (AWT and Swing). Dialogs and menus.	***Lecture, conversation, exemplification***	2h
9. Java and Internet services. WEB programming.	***Lecture, conversation, exemplification***	2h
10. Web clients: applets. Applet Methods.	***Lecture, conversation, exemplification***	2h
11. Applet Class Loaders. Applets security issues. Web Server: servlets and JSP pages.	***Lecture, conversation, exemplification***	2h
12. JavaBeans. Using JavaBeans components in JSP pages.	***Lecture, conversation, exemplification***	2h
13. Java database connectivity. Database access using JDBC.	***Lecture, conversation, exemplification***	2h
14. Java database connectivity. Execution of an SQL statement. Result processing. Closing database connections in Java.	***Lecture, conversation, exemplification***	2h

References:

1. ECKEL, Bruce, Thinking in Java, 4th ed., Upper Saddle River, New JerseyUpper Saddle River, New Jersey : Prentice Hall : Pearson Education, 2006, ISBN 0-13-187248-6, 978-0-187248-6.
2. Bruce Eckel, *Thinking in Java, (3rd edition)*, http://www.bruceeckel.com.
3. Marty Hall, ***Core Servlets and JavaServer Pages***, http://coreservlets.com
4. POPESCU, Nirvana, Data structures and algorithms using Java / Nirvana Popescu, Bucureşti : Politehnica Press, 2008, ISBN 978-973-7838-62-9.
5. HAROLD, Elliotte Rusty, Java Network programming, Sebastopol, CA: O'Reilly, 2005, ISBN 978-0-596-00721-8.
6. SCHILDT, Herbert, Java: a beginner's guide, 4th ed., New York : McGraw-Hill, 2007, ISBN 978-0-07-226384-8.
7. BELL, Douglas, PARR, Mike, Java for students, Harlow, England : Prentice Hall, 2010, ISBN 978-0-273-73122-1.

8. BARNES, David J., Object-oriented programming with Java: an introduction, NEW JERSEY: PRENTICE HALL, 2000.
9. DUDNEY, Bill, LEHR, Jonathan, WILLIS, Bill, MATTINGLY, LeRoy – Mastering JavaServer Faces, 2004 by Wiley Publishing Inc., Indianapolis, Indiana.
10. GEARY, David M. - Core JavaServer faces, David Geary, Cay Horstmann.—2nd ed., 2007 Sun Microsystems, Inc., Network Circle, Santa Clara, California.
11. IANG, Y. Daniel - NetBeans Tutorial - For Introduction to Java Programming, 2005.
12. SINCLAIR, Joseph - Java Web Magic, Macmillan Computer Publishing, 1997.
13. GIRDLEY, Michael, Kathryn A. Jones, et al. - Web Programming with Java, 1996 by Sams.net Publishing, Indianapolis, IN.
14. TIDWELL, Doug - Tutorial: XML programming in Java, Cyber Evangelist, developerWorks XML Team, 1999.
15. PELEGRI-LLOPART, Eduardo, Cable, Laurence P. G. - How to be a Good Bean, 1997 by Sun Microsystems Inc., San Antonio Road, Palo Alto, CA.
16. PELEGRÍ-LLOPART, Eduardo, Cable, Larry - JavaServer Pages Specification ("Specification"), 1999 Sun Microsystems, Inc., Palo Alto, CA.
17. BERGSTEN, Hans - JavaServer Faces, Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA.
18. *** *JDK Documentation*, http://java.sun.com.
19. http://www.developer.com/java/data/article.php/3417381
20. http://www.moreservlets.com/
21. http://myfaces.apache.org/
22. http://www.java2s.com/
23. http://java.sun.com/docs/books/tutorial/getStarted/cupojava/netbeans.html#netbeans
24. http://www.netbeans.org/

Seminars-laboratories	**Teaching methods**	
1. Introduction to Netbeans 7.0 integrated development environment. Basics of Java programming language.	***Project-work, computer-based activities, laboratory activities***	2h
2. Java basic statements	***Project-work, computer-based activities, laboratory activities***	2h
3. Java classes and objects. Objects. Constructors. Class variables.	***Project-work, computer-based activities, laboratory activities***	2h
4. Java classes and objects. Static methods. Inheritance	***Project-work, computer-based activities, laboratory activities***	2h
5. Method Overriding in Java. Data hiding and encapsulation.	***Project-work, computer-based activities, laboratory activities***	2h
6. Abstract classes and methods in Java	***Project-work, computer-based activities, laboratory activities***	2h
7. Java applets. Graphical User Interfaces components.	***Project-work, computer-based activities, laboratory activities***	2h
8. Events generated by AWT components	***Project-work, computer-based activities, laboratory activities***	2h
9. Java Swing. JFrame, JApplet, JPanel, Borders	***Project-work, computer-based activities, laboratory activities***	2h
10. Java Swing.Tabbed Panes, Scrolling Panes, Split Panes	***Project-work, computer-based activities, laboratory activities***	2h
11. Java Swing. Labels and buttons	***Project-work, computer-based activities, laboratory activities***	2h
12. JList. JComboBox. JSpinner.	***Project-work, computer-based activities, laboratory activities***	2h
13. JTree Text Components. JTable. Menus. JtoolBar	***Project-work, computer-based activities, laboratory activities***	2h

14. Individual project presentation based on the knowledge acquired during courses and laboratories.	***Project-work, computer-based activities, laboratory activities***	2h

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1. ECKEL, Bruce, Thinking in Java, 4th ed., Upper Saddle River, New JerseyUpper Saddle River, New Jersey : Prentice Hall : Pearson Education, 2006, ISBN 0-13-187248-6, 978-0-187248-6.
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3. Marty Hall, ***Core Servlets and JavaServer Pages***, http://coreservlets.com
4. POPESCU, Nirvana, Data structures and algorithms using Java / Nirvana Popescu, Bucureşti : Politehnica Press, 2008, ISBN 978-973-7838-62-9.
5. HAROLD, Elliotte Rusty, Java Network programming, Sebastopol, CA: O'Reilly, 2005, ISBN 978-0-596-00721-8.
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9. DUDNEY, Bill, LEHR,Jonathan, WILLIS,Bill, MATTINGLY, LeRoy – Mastering JavaServer Faces, 2004 by Wiley Publishing Inc., Indianapolis, Indiana.
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11. IANG, Y. Daniel - NetBeans Tutorial - For Introduction to Java Programming, 2005.
12. SINCLAIR, Joseph - Java Web Magic, Macmillan Computer Publishing, 1997.
13. GIRDLEY, Michael, Kathryn A. Jones, et al. - Web Programming with Java, 1996 by Sams.net Publishing, Indianapolis, IN.
14. TIDWELL, Doug - Tutorial: XML programming in Java, Cyber Evangelist, developerWorks XML Team, 1999.
15. PELEGRI-LLOPART, Eduardo, Cable, Laurence P. G. - How to be a Good Bean, 1997 by Sun Microsystems Inc., San Antonio Road, Palo Alto, CA.
16. PELEGRÍ-LLOPART, Eduardo, Cable, Larry - JavaServer Pages Specification ("Specification"), 1999 Sun Microsystems, Inc., Palo Alto, CA.
17. BERGSTEN, Hans - JavaServer Faces, Published by O'Reilly Media, Inc., 2005 Gravenstein Highway North, Sebastopol, CA.
18. *** *JDK Documentation*, http://java.sun.com.
19. http://www.developer.com/java/data/article.php/3417381
20. http://www.moreservlets.com/
21. http://myfaces.apache.org/
22. http://www.java2s.com/
23. http://java.sun.com/docs/books/tutorial/getStarted/cupojava/netbeans.html#netbeans
24. http://www.netbeans.org/

9. Corroboration of course contents with the expectations of the epistemic community's significant representatives, professional associations and employers in the field of the academic programme

The knowledge of Advanced Programming Techniques is increasingly valued in web services, presentation of companies and organizations on the Internet. There are many employment opportunities at local, regional and international level.

10. Assessment

Activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	*Final evaluation*	*Written paper*	60%
10.5 Seminar/laboratory	*Continuous assessment*	*Laboratory activities portfolio*	40%
10.6 Minimum performance standard:grade 5 at each criteria			
Modeling and solving problems of average complexity, using mathematics and computer science.			

Submission date Course leader signature Seminar tutor signature

Date of approval by Department members Department director signature