

**Annex 4 –TOPICS OF THE LICENSE/DIPLOMA EXAMS – FULL TIME, UNIVERSITY
YEAR 2022-2023
(FEBRUARY EXAM SESSION 2023)**

FACULTY OF COMPUTER SCIENCE AND ENGINEERING

Bachelor graduate exam,
COMPUTER SCIENCE STUDY PROGRAMME

Computer Science - test exam 1- oral

- test exam 2- oral

Part I: Programming:

1. Characteristics of algorithms. Steps of elaborating algorithms. Methods of designing algorithms.
Top-down, Bottom Up.
2. Structural programming. Principles.
3. Elementary algorithms
 - a. Exchanging the values of two variables .
 - b. Iterating through elements of a set.
 - c. Implementing ordinary mathematical quantizers.
4. Methods and techniques of creating algorithms
 - a. Greedy Method
 - b. Backtracking Method
 - c. Divide et Impera
 - d. Dynamic programming
5. Data structures
 - a. Non homogeneous structures (article, file)
 - b. Vectors: operations with vectors. Sorting methods
 - c. Linked lists
 - d. Binary and search trees
 - e. Graphs
6. Modular programming. Defining and parameterizing subalgorithms.
7. Object-oriented programming. Concepts and principles:
 - a. Class. Abstraction
 - b. Object. Encapsulation
 - c. Attributes (fields)
 - d. Methods (operations)
 - e. Relations between classes.
 - f. Inheritance
 - g. Polymorphism

Part II: Object-oriented programming:

- a. Concepts and principles:
- b. Class. Abstraction
- c. Object. Encapsulation
- d. Attributes (fields)
- e. Methods (operations)
- f. Relations between classes.
- g. Inheritance
- h. Polymorphism

Part III: Databases

1. General principles:
 - a. Basic concept
 - b. Approaching databases
 - c. Levels of abstraction in Database Management Systems (DBMS). Logic basic. Basic concept

2. The process of designing Databases:
 - a. Logical data modeling
 - b. Conceptual model entity-relation
 - c. Desirable properties and functional DBMS
 - d. Rights and users in DBMS
 - e. Transaction administration

3. Relational mapping

4. Normalization:
 - a. Normal forms NF1, NF2, NF3
 - b. Rational schemes

5. Rational algebra:
 - a. Primary and Secondary keys. Integrity constraints

6. Physical projection of relational Databases:
 - a. Database interrogation (SELECT)
 - b. Virtual tables in queries
 - c. Stored routines in DBMS
 - d. Rights and users in DBMS
 - e. Transaction management

Part IV : WEB technologies

1. Essential concepts: clients, servers and communications
 1. Client – server interactions (concepts: client, server, URL, URi)
 2. HTTP Protocol
 1. Definition and general function
 2. HTTP request (general structure, http version, requests, request methods , mime types)
 3. HTTP response (HTTP message, response status, response header)

2. Design element and web interface:
 1. Elements regarding HTML5 language (doctype, html elements, element structure, attributes, coding rules)
 2. CSS language – selector types, precedența selectorilor CSS
 3. The box model
 4. Projection of web interfaces: responsive design

1. Client-side programming
 5. Javascript elements : particularities, data types
 6. DOM manipulation (document object manager)

3. Server-side programming
 1. Server web (Apache) – description, configuration (virtual host)
 2. Parameter request (GET vs. POST)
 3. Using “cookies” and sessions
 4. Databases access

Recommended bibliography

1. Stroustrup B.: The C++ Programming Language, Addison-Wesley, 3rd edition, 1997
2. Schildt H., C++ Manual complet, Teora, 2000
3. Bruce Eckel: [Thinking in C++, 2nd Edition](#) , [Thinking in Java, 3rd Edition](#)
4. Weinberg, P., Groff, J., Opper, A., SQL The Complete Reference, Third Edition, The McGraw-Hill Companies, Inc., ISBN: 978-0-07-159255-0, 2010.
5. Korth H. F., Silberschatz A., ”Database System Concepts”
6. Jackson, C.,J. (2007). “Web Technologies: A Computer Science Perspective” *Prentice-Hall, Inc.*

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