COURSE DATA

Data Subject	
Code	42604
Name	Data structures and databases
Cycle	Master's degree
ECTS Credits	9.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2116 - M.U. en Bioinformática 12-V.1	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
2116 - M.U. en Bioinformática 12-V.1	19 - Data structures and databases	Optional

Coordination

Name	Department
DIAZ VILLANUEVA, WLADIMIRO	240 - Computer Science
FERRIS CASTELL, RICARDO	240 - Computer Science

SUMMARY

The large amount of information generated in bioinformatics should be stored conveniently inside the computer for the programs to process it. It is therefore essential to examine the different types of data that can be used in a program and these are managed. The existence of the database makes it easier for us to store and query this information and knowledge at all levels is essential for bioinformatics.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

None

OUTCOMES

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- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.

LEARNING OUTCOMES

• Know the different data structures and how they are defined by different programming languages studied

• Understand the standard procedures for handling data structures and choose the best strategy for handling them.

• Use iteration technique for solving computational problems.

• Learn to manage and allocate the memory required for each data structure used in a program.

• understand the operation of the memory access data using pointers as reserves and allocates memory for each of the defined pointer.

• Model and design a database in response to user needs.

• Handle languages used in the design of databases, including SQL.

DESCRIPTION OF CONTENTS

1. Sequences: Classification and uses.

Lists and Tuples.
Special cases of Lists: Stacks and Queues
Sets and Frozensets.
Dictionaries (or associative arrays).

2. Complex structures of information

Trees. Definition, use and implementation.
Graphs. Definition and implementations.

3. Memory management: Memory Static Vs. dynamic Memory

Memory management in Python.
Memory Management in C Pointers and related operations.

4. Sequence comparison algorithms

Definition, uses, applications and examples

5. NumPy and SciPy: Bookstores handling 'arrays' and scientific computing.

Uses and examples

6. Introduction to Databases

Definition of database management systems and databases
Types of databases
examples

7. The Relational Model

Basic concepts of relational databases
Codd Rules

8. Databaselanguages. SQL

Queries to the database
Judgments and queries

9. Database Design

Modeling and design techniques
Applications and examples

10. Accesing databases from applications

API Database
Applications and examples

11. NoSQL databases: MongoDB

MongoDB is a non-relational database, without schema and document-oriented.
BSON. Insert, query, update and delete.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	27,00	100
Laboratory practices	18,00	100
Attendance at events and external activities	3,00	0
Study and independent work	10,00	0
Readings supplementary material	45,00	0
Preparation of evaluation activities	25,00	0
Preparation of practical classes and problem	25,00	0
Resolution of case studies	60,00	0
Resolution of online questionnaires	15,00	0
TOTAL	**228,00**	

TEACHING METHODOLOGY

Training tasks of the teaching-learning environment interaction in the classroom through expository sessions. Previous assignments include preparation (information search, reading texts supplied by teachers), teaching sessions themselves and the later work of deepening.

Learning through problem solving and case studies, through which it is acquiring skills on different aspects of materials and subjects. Hands-on lab. Include preparation, implementation of practices to monitor and teacher support, independent work online and reporting practices.

Transferable skills. Include attendance at courses, conferences or round tables organized by the CEC of the Master and / or conduct of a bibliographic work on issues that contribute to the integral. It produces a report of activities.

EVALUATION

Continuous assessment of student interaction in the classroom or lab or online activities conducted in groups (25%).

Evaluation reports or reports submitted regarding training activities and case studies problems of cross-cutting activities or others that arise in individual form (40%).

Evaluation reports or reports submitted concerning laboratory practice (35%).

You need to get at least 3.5 on the evaluation of the work submitted to make the average of the notes and have delivered at least 90% of the work.

The final grade for the course is obtained by weighting with a 40% grade in the section on data structures and a 60% grade in the section Databases.

On second call the weights of the different sections, being able to improve or deliver all jobs except those conducted in groups will be retained.

REFERENCES

Basic

- Referencia b1: [Raúl González Duque]Python para todos (http://mundogeek.net/tutorial-python/)
- Referencia b2: [Ramez A. Elmasri, Shamkant B. Navathe, 2005] Fundamentos de sistemas de bases de datos

Additional

- Referencia c1: [Ramakrishnan, Gehrke, 2003] Database Management Systems

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

English version is not available