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Contest Topics for Associate Professor
Position 59, 2021-2022, semester 1

Disciplines: Databases, Software Packages

Databases

1. Data models: definition of data models, data structures, operators, integrity constraints. Typology of data models. The role and limitations of data models.
2. Databases: database concept, organization levels, database administration, types.
3. Database management systems: definition, objectives, functions. Typology of database management systems.
4. Functions, architecture and classification of database management systems
5. Relational databases. Relational model: relational structure of data, relational model operators, integrity constraints.
6. Designing relational databases. The stages of designing a relational database.
7. Designing the structure of relational databases. Anomalies and normal forms of relationships. The normalization technique.
8. SQL language. Types of commands. Example in Oracle Database
9. Mechanisms for optimizing and protecting the databases
10. Architecture and objects management in Oracle Database.
11. Solutions for data recovery in case of incidents
12. Distributed databases. Data distribution techniques. Data allocation strategies.
13. Organization and management of large volumes of data. NoSQL databases
14. Management of document collections in MongoDB

References:

1. Adela Bâra, Iuliana Botha, Anca Fodor, Ion Lungu, Simona Vasilica Oprea - *SGBD - Introducere in limbajul SQL*, Editura ASE, 2017
2. Ion Lungu (coord.), Adela Bâra, Constanţa Bodea, Iuliana Botha, Vlad Diaconiţa, Alexandra Florea, Anda Velicanu – *Tratat de baze de date. Vol I. Baze de date. Organizare, proiectare şi implementare*, Editura ASE, 2011
3. Ramez Elmasri, Shamkant Navathe - *Fundamentals of Database Systems*, 7th Edition, Editura Pearson Education Limited, 2016
4. Connolly Thomas M., Carolyn E. Begg - *Database Systems – A Practical Approach to Design Implementation and Management*, 6th Edition, Editura Pearson, 2014
5. Lungu Ion, Bâra Adela, Mihai Andronie – *Administrarea bazelor de date*, Editura ASE, Bucureşti 2008

6. C.J. Date – *An introduction to database systems*, Editura Addison-Wesley, 2004
7. *Oracle Database Online Documentation Library, 21c*, disponibila online: https://docs.oracle.com/en/database/oracle/oracle-database/21/index.html, actualizat septembrie 2021
8. Alex Petrov, Database Internals: A Deep Dive into How Distributed Data Systems Work, O'Reilly Media, 2019
9. Amit Phaltankar, Juned Ahsan, Michael Harisson, Liviu Nedov – MongoDB Fundamentals. A hands-on guide to using MongoDB and Atlas in the real world, Packt, 2021

Software Packages

1. Software package concept. Integrated software packages - SAS
2. Data source management and file import into SAS
3. Data processing in the SAS Enterprise Guide: SAS tables, transposition of data tables, queries, joins
4. Programming in SAS language
5. Conditional and iterative processing in SAS language
6. Data analysis in SAS: reports, frequency tables, data aggregation, graphs.
7. Predictive data analysis in SAS using stochastic methods: autoregression, ARMA, ARIMA
8. Structural equations models - confirmatory factorial analysis, hierarchical models and bifactor models in SAS
9. Python programming elements: data types, variables, operators, lists, dictionaries, sets, tuples, conditional and repetitive structures
10. File processing in Python: .txt, .csv, .json.
11. Relational databases integration in Python
12. NoSQL databases integration in Python
13. Dataframes in Python. Graphical representation of data in Python.
14. Python packages used in data analysis

References:

1. Ileana Adina Uta, Anca Ioana Andreescu, Simona Vasilica Oprea - *Pachete software si aplicatii SAS*, Editura ASE, 2018
2. S. Slaughter and L. Delwiche - *The Little SAS Book for Enterprise Guide 4.2*, Editura SAS Press, 2010 (pg 120-322)
3. Neil Constable - *SAS Programming for Enterprise Guide Users*, Second Edition, Editura SAS Publishing, 2010 (pg 1-66)
4. Mark Lutz - *Learning Python*, Editura O'Reilly, 2013
5. John V. Guttag - *Introduction to Computation and Programming Using Python: With Application to Understanding Data*, Editura MIT Press, 2016

6. Wes McKinney - *Python for data analysis: data wrangling with pandas, numpy and ipython, 2nd Edition*, Editura O'Reilley, 2017
7. Joel Grus - *Data Science from Scratch*, Editura O'Reilley, 2017
8. Norm O'Rourke, Larry Hatcher - *A Step-by-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling*, Ed. SAS Institute, 2013
9. Timothy A. Brown - Confirmatory Factor Analysis for Applied Research, The Guilford Press, 2015

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