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|--|---|---|------|-------------------------|----|-----------|-----|
| Program  | Level   | First cycle   |      |                         |    |           |     |
|  | Name of the program   | Theoretical Computer Science, Applied Mathematics, Pure Mathematics |      |                         |    |           |     |
| <b>COURSE</b>  |   |   |      |                         |    |           |     |
| Course title   | <b>Databases</b>  |   |      |                         |    |           |     |
| Course code  | Semester  | Course status   | ECTS | Contact hours (L+AE+LE) |    |           |     |
| CS 330   | V   | Mandatory course/Elective course                                    | 5    | 3+0+2                   |    |           |     |
| Lecturer   |   |   |      |                         |    |           |     |
| Course Goals   | The course aims to familiarize students with entities, relations, models, SQL database language, logical design and database integrity. The above concepts are necessary for students to understand the working principles of databases and information systems. In addition, students will be familiar with the methodology of solving problems in relational databases. |   |      |                         |    |           |     |
| Learning Outcomes  | Through the mentioned subject, students will master the use of the SQL language through independent work on laboratory exercises as a means for designing and implementing a small information system, as well as training students to develop such and similar techniques.   |   |      |                         |    |           |     |
| <b>COURSE CONTENT</b>  |   |   |      |                         |    |           |     |
| <ul style="list-style-type: none"> <li>• Relational data model; Formalisms of the relational model; Relational algebra; Relational calculus;</li> <li>• Relational query languages. SQL Query language; Views; SQL standards</li> <li>• Logical dependencies; Functional dependence; Ambiguous dependencies;</li> <li>• Normal forms (NF): First normal form; Second normal form; Third normal form; Other normal forms;</li> <li>• Boyce-Codd normal form;</li> <li>• Fourth normal form; Fifth normal form</li> <li>• Structures and algorithms. Sequential representation.</li> <li>• Direct organization.</li> <li>• Index representation; Network representation.</li> <li>• Transaction management. –</li> <li>• Data integrity; Transactions and integrity; Locking protocols.</li> <li>• Logical padlocks; Physical padlocks; Distributed databases.</li> </ul>                    |   |   |      |                         |    |           |     |
| <b>LITERATURE</b>  |   |   |      |                         |    |           |     |
| [1] N.Dukic, Relacione baze podataka, Prirodni-matematički fakultet Sarajevo 2016.<br>[2] S. Alagić, Relacione baze podataka, Svijetlost, Sarajevo 1985.<br>[3] C.J. Data, An Introduction to Database Systems, Addison-Wesley, 1989.<br>[4] B.C.Desiai, An Introduction to Database Systems. West Publishing Company 1997.<br>[5] A.J.Fabbri, A.Robert Schwab. Practical Database Management, PWs Kent Publishing Company 1999.<br>[6] F.R.McFadden, J.A.Hoffer. Database Management. Publishing Company 1998.<br>[7] C.Ricardo, Database Systems.Macmillan Publishing Company 1999.<br>[8] J.D. Ullman, Principles of Database Systems. Computer Science Press,1980.<br>[9] N. Wirth, Algorithms + Data Structure = Programs, Prentice Hall, 1976.<br>[10] P.B. Davis. Database Systems. Macmillan Computer Science, 1996.<br>[11] R.F. Lans. Introduction to SQL. Addison Wesley, 1993. |   |   |      |                         |    |           |     |
| <b>STUDENT WORKLOAD (hours in a semester)</b>  |   |   |      |                         |    |           |     |
| Lectures   | 45  | Exercises   | 30   | Individual work         | 50 | T o t a l | 125 |
| <b>GRADING</b>   |   |   |      | <b>REMARKS</b>          |    |           |     |
| Criterion  | Maximum points  | Minimum points  |      |                         |    |           |     |
| Midterm exams  | 5   | 3   |      |                         |    |           |     |

|            |     |    |  |
|------------|-----|----|--|
| Homework   | 5   | 3  |  |
| Projects   | 40  | 21 |  |
| Seminar    | 5   | 3  |  |
| Final exam | 45  | 25 |  |
| T o t a l  | 100 | 55 |  |