

| <b>Course title: Databases</b>  |  |   |                               |                      |
|---|--|---|-------------------------------|----------------------|
| <b>Course code</b>  | <b>Course status</b>   | <b>Semester</b>   | <b>Number of ECTS credits</b> | <b>Lecture hours</b> |
| <b>PA2101</b>   | <b>Mandatory</b>   | <b>I</b>  | <b>6</b>                      | <b>3L+1E+1L</b>      |
| <b>Study program:</b><br>Graduate academic studies, ELECTRICAL ENGINEERING, study program: Electronics, Telecommunications and Computer engineering (studies last for 4 semesters, 120 ECTS credits).   |  |   |                               |                      |
| <b>Prerequisites:</b> Programming language I i Programming language II.   |  |   |                               |                      |
| <b>Course aims:</b><br>Students will be introduced in basic concepts related to data modeling, model entity-relationship, relation data model, logical database design, systems for managing databases. During the laboratory exercises, the students will work with SQL. |  |   |                               |                      |
| <b>Teacher(s) and assistant(s) first and last names:</b><br>Prof. dr Jaroslav E. Poliščuk –teacher, Predrag Raković - assistant   |  |   |                               |                      |
| <b>Studying method:</b><br>Lectures, exercises, individual work on practical tasks, seminar works, consultations.   |  |   |                               |                      |
| <b>Course synopsis:</b>   |  |   |                               |                      |
| Preliminary week  | Preparation and semester enrolment.  |   |                               |                      |
| I week  | Basic about IS development; Systems for managing databases; Basic concept of data modeling: classification, structure, limitations and operators;  |   |                               |                      |
| II week   | Functional dependence; Data model entity-relationship: structure, concepts, Grafical representation of model concepts, the principles of diagram design for entity-relationship model.               |   |                               |                      |
| III week  | Limitations and operators of the entity-relationship data model, Traslating the entity-relationship data model to the relational model: Chen's procedure; Example of entity-relationship data model. |   |                               |                      |
| IV week   | <i>Defence of the first part of seminar work.</i>  |   |                               |                      |
| V week  | Classical relational data model (RM): structure RM, concepts of RM, relational databases, relational scheme,   |   |                               |                      |
| VI week   | Limitations of the RM, operators of the RM, relational algebra;  |   |                               |                      |
| VII week  | Extended relational data model: concepts of extended RM, modeling f extended RM,   |   |                               |                      |
| VIII week   | Types of entities within extended RM, generalization and agregation, data vocabulary.  |   |                               |                      |
| IX week   | <i>Defence of the second part of seminar work.</i>   |   |                               |                      |
| X week  | Logical database design: design of canonical model of database using the normalization method;   |   |                               |                      |
| XI week   | First normalized form, second normalized form, third normalized form;  |   |                               |                      |
| XII week  | Design of canonical model using analysis of non-normalized relations:  |   |                               |                      |
| XIII week   | Data model representation using a set of input/ouput documents, basic concepts of object relational data model.  |   |                               |                      |
| XIV week  | <i>Final exam</i>  |   |                               |                      |
| XV week   | Administrative procedures.   |   |                               |                      |
| XVI week  | Additional lessons, correction of the final exam and administrative procedures.  |   |                               |                      |
| XVII week   |  |   |                               |                      |
| XVIII-XXI week  |  |   |                               |                      |
| <b>STUDENT WORKLOAD</b>   |  |   |                               |                      |
| <u>per week</u>   |  | <u>per semester</u>   |                               |                      |
| <b>Working hours: 6 credits x 40/30 = 8 hours.</b>  |  | <b>Teaching and the final exam: (8hours) x 16 = 128hours.</b>   |                               |                      |
| <b>Working hours structure:</b>   |  | <b>Necessary preparation (before semester): 2 x (8hours) = 16hours.</b>                                       |                               |                      |
| 3 hours for teaching  |  | <b>Total work hours for the course: 180hours</b>  |                               |                      |
| 2 hour for exercises  |  | <b>Additional hours</b> for preparing correction of the final exam, including the exam taking: up to 33hours. |                               |                      |
| 3 hours for individual work, including consultations.   |  | <b>Work hours structure:</b>  |                               |                      |
|   |  | 128hours (lectures) + 16hours (preparation) + 36hours (additional work)                                       |                               |                      |
| Lessons attendance is mandatory for students, as well as doing home and laboratory exercises and both tests. Public defence of the seminar works.   |  |   |                               |                      |
| <b>Literature:</b><br>Poliščuk E. J.: Databases, JEP, Podgorica, 2003. ( <i>teory and SQL</i> )   |  |   |                               |                      |
| <b>The forms of knowledge testing and grading:</b>  |  |   |                               |                      |
| <ul style="list-style-type: none"> <li>Seminar work that consists of two parts carries 50 points;</li> <li>Final exam – 50 point.</li> </ul> Student gets the passing grade by collecting 50 points at least.   |  |   |                               |                      |
| <i>Special remarks for the course :</i>   |  |   |                               |                      |
| <b>Teacher(s) who provided the information: Prof. dr Jaroslav E. Poliščuk</b>   |  |   |                               |                      |