

| <b>Course title: CONTROL AND REGULATION OF ELECTRICAL DRIVES</b>  |  |   |                               |                      |
|---|--|---|-------------------------------|----------------------|
| <b>Course code</b>  | <b>Course status</b>   | <b>Semester</b>   | <b>Number of ECTS credits</b> | <b>Lecture hours</b> |
| <b>PA 4201</b>  | <b>Mandatory</b>   | <b>II</b>   | <b>5</b>                      | <b>3P+1V+0L</b>      |
| <b>Study program:</b><br>Master studies, ELECTRICAL ENGINEERING, study program: Power systems and Control (studies last for 10 semesters, 300 ECTS credits).<br>Postgraduate studies, ELECTRICAL ENGINEERING, study program: Power systems and Control (studies last for 8 semesters, 240 ECTS credits) |  |   |                               |                      |
| <b>Prerequisites:</b><br>No prerequisites required.   |  |   |                               |                      |
| <b>Course aims:</b><br>Students will be introduced with problems regarding electrical drives, their application and project phases.   |  |   |                               |                      |
| <b>Teacher(s) first and last names:</b><br><i>PhD Djordje Jovanovic - professor</i>   |  |   |                               |                      |
| <b>Studying method:</b><br>Lectures, exercises, individual work on practical tasks, consultations.  |  |   |                               |                      |
| <b>Course synopsis:</b>   |  |   |                               |                      |
| Preliminary week  | Preparation and semester enrolment.  |   |                               |                      |
| I week  | Introduction. Modern automated electrical drives and their classification.                 |   |                               |                      |
| II week   | Overview of operators methods for analysis and synthesis.                                  |   |                               |                      |
| III week  | Overview of state space model.   |   |                               |                      |
| IV week   | DC automated electric drives (DCAED).  |   |                               |                      |
| V week  | Control of DCAED: drives with thyristor converters.  |   |                               |                      |
| VI week   | I colloquium   |   |                               |                      |
| VII week  | Regulation with choppers. Reversible DCAED.  |   |                               |                      |
| VIII week   | Regulation of DCAED: dynamic of actuator, cascade regulation.                              |   |                               |                      |
| IX week   | Synthesis of current loop with symmetrical optimum.  |   |                               |                      |
| X week  | AC automated electrical drives.  |   |                               |                      |
| XI week   | Control of automated electric drive with induction motor - overview of typical schemes.    |   |                               |                      |
| XII week  | II colloquium  |   |                               |                      |
| XIII week   | Vector's control: direct and indirect.   |   |                               |                      |
| XIV week  | Regulation of automated electric drives with induction motor - overview of typical schemes |   |                               |                      |
| XV week   | U/f control with compensation, with regulation of current and speed.                       |   |                               |                      |
| XVI week  | Synthesis of different types of regulators with examples.                                  |   |                               |                      |
| Final week  | Administrative procedures.   |   |                               |                      |
| XVIII-XXI week  | Additional lessons, correction of the final exam and administrative procedures.            |   |                               |                      |
| <b>STUDENT WORKLOAD</b>   |  |   |                               |                      |
| <u>per week</u>   |  | <u>per semester</u>   |                               |                      |
| <b>Working hours: 6 credits x 40/30 =6 hours and 40 minutes</b>   |  | <b>Teaching and the final exam:</b> (6hours and 40 minutes) x 16 = 106 hours and 40 minutes.  |                               |                      |
| <b>Working hours structure:</b><br>3 hours for teaching<br>1 hour for exercises<br>2 hours and 40 minutes for individual work, including consultations.   |  | <b>Necessary preparation</b> (before semester): 2 x (6hours and 40 minutes) = 13hours and 20 minutes.                                 |                               |                      |
|   |  | <b>Total work hours for the course:</b> 150hours  |                               |                      |
|   |  | <b>Additional hours</b> for preparing correction of the final exam, including the exam taking: up to 30hours.                         |                               |                      |
|   |  | <b>Work hours structure:</b><br>106hours and 40 minutes (lectures) + 13hours and 20 minutes (preparation) + 30hours (additional work) |                               |                      |
| Lessons and laboratory exercises attendance is mandatory for students, as well as doing homework and colloquiums .  |  |   |                               |                      |
| <b>Literature</b><br>1. Vučković V.: Električni pogoni, ETF, Beograd, 1997.<br>3. Čilikin M.G. i dr.:Teorija avtomatizirovanog elektroprivoda, Energija, Moskva, 1979.  |  |   |                               |                      |
| <b>The forms of knowledge testing and grading:</b><br>- Home exercises carry 5x1 points.<br>- Laboratory exercises carry 5 points.<br>- I and II colloquium carries 20 points (40 points total).<br>- Final exam carries 50 points<br>Student gets the passing grade by collecting 51 points at least.  |  |   |                               |                      |
| <b>Special remarks for the course</b><br>Lessons and exercises are performed for groups of 40 students, and laboratory exercises are performed for groups of 10 students.<br>If needed, the course can also be taught in English  |  |   |                               |                      |
| <b>Teacher(s) who provided the information: PhD Djordje Jovanovic</b>   |  |   |                               |                      |
| <b>Note: -</b>  |  |   |                               |                      |