Vinnytsia National Technical University
Department of Power Plants and Systems
Faculty of Power Engineering and Electromechanics

MODERN INFORMATION TECHNOLOGIES IN ELECTRICAL ENERGY INDUSTRY, ELECTRICAL ENGINEERING AND ELECTROMECHANICS

(Compulsory)
Master's level of higher education
Educational program: Power plants
Specialty: 141 – electrical engineering and electromechanics

Lecturer: Oleksandr Burykin
ECTS credits – 3 (90 hours)
Lectures – 27 hours
Practical lessons – 0 hours
Laboratory lessons – 18 hours
Self-support work – 45 hours
The course is given in English

Course content

The subject of study of the course "Modern information technologies in electrical energy industry, electrical engineering and electromechanics" are operational information systems of power stations and methods of their information processing in them. The purpose of learning the course is to train engineers and masters in the field of database development to solve problems in the fields of power engineering, electrical engineering and electromechanics. The main attention is paid to the consideration of existing management systems and database formation, database construction, data models and types, design and use of databases in accordance with the tasks of electric power stations.

Learning outcome

Knowledge:

After completing this course, the candidate should:

- know the basics of database and information systems design;
- know the database models and types;
- know the structured database query language;
- know the purpose and structure of operational and information complexes in power systems.

Skills:

After completing this course, the candidate should be able to:

- logically and consistently use the mastered material;
- make independent scientifically substantiated conclusions and generalizations;
- argue to defend their point of view and reasoning;
- use methods of designing databases in the field of electricity;
- apply the structured database query language;

General competence:

After completing the course, the candidate has increased:

- skills in cooperation and interdisciplinary collaboration;
- ability to communicate effectively to professionals and non-specialists alike through reports and presentations;
- ability to contribute to innovation and innovation processes.

Information volume of the discipline

Module 1*. Fundamentals of database construction*

Task 1. *Introduction to databases and information systems in the power industry. Basics of building databases. Introduction to databases. Databases and information systems. [1, p. 7-11; 2, c. 41-49] Local information systems. [1, p. 12-19]*

Task 2. *Data models and types. Hierarchical model. Network model. Postrelation model. [1, p. 27-35; 2, c. 56-57] Multidimensional model. Object-oriented model. [1, 36-42]*

Task 3. *Relational data model. Definition of a relational model. [1, pp.45-48; 2, p.103-128] Indexing. Linking tables. Control of integrity of communications. [1, p. 49-60; 2, c. 337-381]*

Task 4. *Structured SQL query language. Data manipulation operators. [1, p. 94-102; 2, c. 133-162; 3, c. 379-572] (Students' independent work): Aggregate functions [3, p. 38] Data definition operators. [1, p. 94-102; 2, c. 1199-1208]*

Module 1*. Fundamentals of information systems construction*

Task 5. *Operational and information complexes of electric power stations. Hardware and software complex of the power stations.*

Task 6. *Methods and means of information transmission in the power industry. Reference model of open systems interaction. The structure of the data transmission system. Methods and means of information transfer. Types of communication channels. Types of communication interfaces. [1-3]*

Task 7. *Information systems in networks. Basic concepts. Client-server architecture models. Distributed data management. [1, p. 105-124] Information systems in local networks. Information systems on the Internet and intranet. [1, p. 125-138] (Students' independent work): Network settings [3, p. 70]*

Task 8. *Computer systems for dispatch control of electrical installations. Automated control systems (ACS). The structure of ACS. Telemechanics systems. Simplex and duplex telemechanics systems. Telemetry systems. Telesignal systems. Telecontrol systems. Telecontrol systems*

Learning methods and activities

Lectures. Compulsory exercises and computer simulations. Compulsory project work.

Further on evaluation

The final evaluation will be based on a current control of knowledge (30%), a project (counting 45%) and a test-written examination (counting 25%) based on % fulfillment. Final grading will be from A to F. If there is a re-sit examination, the examination form may change from test-written to oral. In

the case that the student receives an F/Fail as a final grade after both ordinary and re-sit exam, then the student must retake the course in its entirety. Submitted work that counts towards the final grade will also have to be retaken.
Permitted examination aids, support material: No printed or hand-written support material is allowed. A specific basic calculator is allowed.

Course materials

1. Databases: Textbook for higher education institutions / Khomonenko LD, Tsygankov VM, Maltsev MG / Ed. prof. AD Khomonenko. - 6th ed., Ext. and rework. - SPb .: CROWN print, 2009 - 736 p. Russian ISBN 978-5-7931-0527-9;

2. Date C.J. An Introduction to Database Systems. 8th edition. — New York: Pearson, 2003. — 1034 p. English ISBN-13: 978-0321197849;

3. Helen Borrie. The Firebird Book: A Reference for Database Developers. – Apress; 1 edition 2004. – 1128 p. English ISBN-10: 1590592794;

4. Stephen Wynkoop. Special Edition Using Microsoft SQL Server 7.0. — Que Pub, 1999. — 766 p. English ISBN-13: 978-0789715234