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Introduction to the theory of Data-bases

This course will be updated to include a new module on *"Data Management and Analytics for Energy System".*

- The main objective is to understand the integration of database technologies with energy system operations, focusing on the management, analysis and visualization of data specific to energy production, distribution and consumption.

Key Learnings:

- Understand the role of data analytics in energy efficiency and renewable energy integration.
- Gain insights into the use of smart grid data to improve system reliability and performance
- Explore case studies on how large-scale data management is implemented in modern energy systems.

Curriculum:

- Introduction to energy data types and sources
- Overview of data analytics applications in smart grids and renewable energy systems
- Practical exercises using simulated datasets to perform energy-related data analysis
- Case studies on predictive maintenance, load forecasting and energy consumption optimization

Method: The course will use direct communication and demonstration with slides, practical exercises involving SQL queries tailored to energy systems, and analysis tools provided in the MariaDB environment

Security and Risks on Information Systems

This course will incorporate a segment on “Cybersecurity for Energy Systems” expanding its coverage to address specific security challenges in the energy industry.

Key Learnings:

- Understand the unique cybersecurity challenges faced by the energy sector, especially in the context of smart grids and renewable energy systems.
- Learn abut specific security measures and technologies that can protect cloud-based energy data and infrastructure.
- Explore the integration of robust cybersecurity practices into cloud computing environments to ensure data integrity and system reliability

Curriculum:

- Itroduction to cybersecurity in the energy sector, focusing on the vulnerabilities of smart grids and renewable energy systems.
- Detailed study of cloud security practices as they apply to energy systems,including data encryption, threat detection, and the secure management of virtualized resources.
- Case studies on recent cybersecurity incidents in the energy sector and lessons learned
- Practical exercises on developing and implementing security solutions for cloud-based energy systems.

Method:

- Combination of direct communication, interactive discussions, and practical demonstrations using simulation software and cloud platforms.
- Student will engage in group projects to design cybersecurity solutions for hypothetical scenarios in the energy sector.

Introduction to Project Management

Adjustments will be made to integrate “Project Management in the Energy Sector” providing insights into the unique aspects of managing energy projects.

Key Learnings:

- Understand the specific requirements and challenges of project management in the energy sector, including regulatory and environmental considerations.
- Learn about project lifecycle for energy sector projects, from conception through to decommissioning.
- Gain insights into effective stakeholder management and communication strategies tailored for energy projects.
- Analyze case studies on successful and failed energy projects to identify best practices and common pitfalls.

Curriculum:

- Overview of the energy sector and its impact on project management practices
- Discussion on the integration of traditional and renewable energy sources and the project management approaches suited for each.
- Case studies focusing on the management of large scale energy projects, including nuclear, solar and wind .
- Examination of the role of government regulations and policy in shaping project management strategies in the energy sector

Smart Grid Technology

Course Description and Objectives

This course is designed to provide students with comprehensive understanding of smart grid technology, its components and applications.

The objectives of the course are to equip students with the knowledge to:

- Understand the architecture and operation of smart grids.
- Analyze the impact of renewable energy sources on smart grids components.
- Evaluate cybersecurity measures necessary for protecting smart grids.

Smart Grid Technology

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Key Concepts:

1. Smart Grid Basics
2. Renewable Energy Integration
3. Data Management
4. Cybersecurity in Smart Grids
5. Grid Automation
6. Demand Response
7. Advanced Metering Infrastructure
8. Electric Vehicles Grid Infrastructure
9. Power Electronics
10. Regulatory and Policy Framework
11. Energy Storage Solutions
12. Grid Resilience and Reliability
13. Consumer Engagement
14. Emerging Technologies in Smart Grids
15. Project Management in Smart Grid Deployment

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