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Yashwantrao Chavan College of Arts, Commerce & Science
Koperkhairane NAVI MUMBAI
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DEPARTMENT OF SCIENCE

COURSE: BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSc IT)

PROGRAM OUTCOME (POs)

A Bachelor of Science in Information Technology (BSc IT) program typically prepares students for careers in the information technology field. The program covers a broad range of topics related to the design, development, and management of computer-based information systems. Program outcomes of a BSc IT program include:

- 1. Technical skills:** Students should develop strong technical skills in areas such as programming languages, database design, networking, cybersecurity, and software development.
- 2. Problem-solving skills:** Students should be able to analyze complex problems and develop solutions using information technology tools and techniques.
- 3. Communication skills:** Students should be able to communicate effectively with colleagues and stakeholders, both verbally and in writing.
- 4. Teamwork and collaboration:** Students should learn to work effectively in teams and collaborate with others to develop and implement information technology solutions.
- 5. Ethical and professional conduct:** Students should be aware of ethical issues in information technology and demonstrate professional conduct in their work.
- 6. Lifelong learning:** Students should have a strong foundation in information technology that will enable them to adapt to new technologies and continue learning throughout their careers. Overall, a BSc IT program aims to prepare students to be competent, skilled, and ethical professionals in the field of information technology.



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DEPARTMENT OF SCIENCE

COURSE: BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSc IT)

Program Specific Outcome (PSOs)

- Graduates will have a strong foundation in information technology concepts and technologies, including programming languages, databases, networks, and systems development.
- Analyzing complex problems and developing effective solutions using information technology tools and methodologies.
- Attain proficiency in programming languages and software development practices, enabling them to design and create software applications.
- Attain familiarity with database management systems, including the design, implementation, and maintenance of databases.
- Understanding of cybersecurity principles, including securing networks and systems from threats.
- Acquired skills in web development, including designing and building websites and web applications.
- Understand the principles of information systems management, including project management, system analysis, and the integration of technology into business processes.
- Acquired skills in developing mobile applications for various platforms.
- Be familiar with cloud computing concepts and technologies, including the deployment and management of applications and services in cloud environments.
- Prepared to adapt to new tools, programming languages, and technologies throughout their careers.



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COURSE: BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSc IT)

COURSE OUTCOME (COs)

FYIT SEMESTER I

USIT101 Imperative Programming

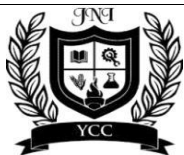
1. Apply the fundamental concepts of programming to write simple programs in C.
2. Understand the history and evolution of programming languages and models.
3. Synthesize programming logic using pseudocode and flowchart symbols to develop programs.
4. Evaluate program logic to identify and fix errors and bugs.
5. Create efficient and effective programs by applying programming concepts and techniques.
6. Understand the program development cycle and the importance of debugging and testing.
7. Apply conditional statements and loops to decision making within a program.
8. Understand the use and implementation of arrays and strings in programming.
9. Evaluate program structure and design to ensure readability, maintainability and scalability.
10. Create and use functions and pointers to modularize and optimize program code.

USIT102 Digital Electronics

1. It is designed for computer students who have limited or no previous exposure to python datastructure.
2. To learn different architecture and organization of memory systems.
3. After studying this subject student will understand actual practical process, organization and control unit.
4. It will help the student to understand how digital and analog system, device and components work on number system principles.
5. It will help the students to understand of digital system and operations of a digital computer.

USIT103 Operating Systems

1. The fundamental concepts and principles of operating systems, including their functions, components, and design principles.
2. How operating systems manage resources, including memory, file systems, input/output devices, and processors.
3. The various scheduling algorithms used by operating systems, and how to evaluate their performance.
4. How to implement and debug basic operating system components, such as device drivers, memory management, and process scheduling.
5. How to design and implement multi-threaded and multi-process applications that use synchronization and communication mechanisms provided by the operating system.
6. How to apply principles of operating systems to solve practical problems in fields such as computer science, engineering, and science



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USIT104 Discrete Mathematics

1. To understand the concepts of mathematical logic for analyzing propositions via truth tables and proving theorems.
2. Apply sets for analyze & solving applied problems, and apply the properties of set operations algebraically.
3. Help to understand the purpose of mathematical induction is to be able to prove an equation works for all natural numbers and help how to find the recursive formula of a sequence.
4. Understand the relations on sets and their properties.
5. Investigate functions as relations and their properties and Evaluate functions as relations and their properties.
6. To understand the basic concepts of graphs, digraphs, and trees.

USIT105 Communication Skills

1. Apply the Seven Cs of Effective Communication in their written and oral communication.
2. Understand the nature and scope of communication, including non-verbal and cross-cultural communication.
3. Synthesize effective business messages and documents, including correspondence, reports, proposals, instructions, and resumes.
4. Evaluate and improve their oral communication skills, including effective listening, public speaking, and interpersonal communication.
5. Create and deliver effective presentations, including planning, executing, and impressing the audience with visual aids and effective use of font, color, and layout.
6. Collaborate effectively in group discussions, team presentations, and business meetings and conferences.
7. Understand and address specific communication needs across functional areas, including corporate communication, persuasive strategies, and ethics in business communication.

FYIT SEMESTER - II

USIT201 Object oriented Programming

1. Understand the key principles of object-oriented programming (OOP) and how they can be applied in C++.
2. Identify the advantages of using OOP, including code reusability, maintainability, and scalability.
3. Utilize C++ data types, operators, and control structures to develop simple programs.
4. Use object-oriented concepts such as classes, objects, and encapsulation to design more complex program.
5. Create constructors and destructors in C++ and understand their role in object instantiation and destruction.
6. Implement inheritance and polymorphism in C++ programs to facilitate code reuse and extensibility.
7. Understand and apply advanced C++ features such as templates, exceptions, and streams.
8. Debug and test object-oriented programs effectively to ensure high code quality.
9. Understand the basics of file handling in C++ and how to read and write data to files.
10. Develop effective coding habits and practices that adhere to object-oriented programming principles and best practices.



USIT202 Microprocessor Architecture

1. This course helps the students to understand the concept of hardware programming of microprocessor.
2. Students will learn different interfacing of input output devices.
3. This course helps the students to perform testing and troubleshooting input output interfacing circuits.
4. Students will learn the complete model of microprocessor 8085 and assembly language programming.
5. To learn microprocessor software-based software development system, operating system and programming tools related to 8085.

USIT203 Web Programming

1. Students will understand the principles of web programming, including web development frameworks, HTML, CSS, and JavaScript.
2. Students will be able to create and design web pages using HTML and CSS, including understanding web layout, typography, and responsive design.
3. Students will be able to write JavaScript code to enhance the functionality of web pages, including interactivity, user input validation, and dynamic content creation.
4. Students will learn how to use web development frameworks such as React, Angular, or Vue.js to create scalable and maintainable web applications.
5. Students will understand how to use server-side technologies such as PHP, Node.js, or ASP.NET to develop dynamic web applications.

USIT204 Numerical and Statistical Methods

1. To understand and solve real life problems on the concepts of numerical analysis and statistics.
2. Apply various methods of evaluate algebraic/transcendental equations and system of simultaneous equations.
3. To understand the areas applied in numerical interpolation, differentiation, integration and differential equations and method of finding solutions.
4. To apply the probability theory and solve the problems.
5. To learn what probability is by predicting the outcome of planned experiments, and playing racing games.
6. We need to understand how to calculate the value of the regression coefficient and least squares
7. Regression line given parts of the formula.
8. To understand how to find optimal solution using LPP.

USIT205 Green Computing

1. Learner will able to understand what is Green Computing and what are different
2. techniques to reduce the use of electricity.
3. They will able to understand the less usage of energy for producing, using, and disposing
4. of products, which translates into lower carbon dioxide emissions.
5. They will able to calculate the Carbon footprint of organization.
6. Define Green IT and its significance in the modern era.
7. Understand the principles of sustainable computing and the role of IT in achieving sustainability goals.



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8. Describe the energy consumption of computing systems and evaluate the environmental impact of computing.
9. Analyze the benefits and drawbacks of virtualization, cloud computing, and green data centers.
10. Identify and assess various strategies for reducing the environmental impact of computing systems, such as power management, recycling, and green procurement.
11. Design and implement eco-friendly computing systems, and evaluate their effectiveness in reducing energy consumption and environmental impact.
12. Apply the principles of green IT in the development of software, including the use of eco-design and sustainable programming practices. Evaluate the legal and ethical implications of green IT, including privacy, data security, and compliance with environmental regulation.

SYIT SEMESTER III

USIT301 Python Programming

1. Students will be able to understand the basic concepts of programming such as variables, data types, control structures, functions, and objects.
2. Students will be able to use Python libraries to solve problems related to data analysis, data visualization, scientific computing, and machine learning.
3. Students will learn how to use Python to manipulate data, including reading and writing data to files, processing data in memory, and cleaning and transforming data.
4. Students will understand the principles of object-oriented programming and be able to write Python programs using classes, objects, and inheritance.
5. Students will learn how to use Python to build web applications, including using web frameworks such as Flask or Django.
6. Students will be able to use Python to work with databases, including connecting to databases, querying data, and modifying data.

USIT302 Data Structures

1. Understanding the fundamental concepts of data structures: Students will learn the basic concepts of data structures such as arrays, linked lists, stacks, queues, trees, graphs, and their properties.
2. Ability to analyze algorithms: Students will be able to analyze the time and space complexity of various algorithms and select appropriate data structures to optimize their performance.
3. Ability to implement data structures: Students will be able to implement various data structures using programming languages such as C, C++, Java, or Python.
4. Ability to solve problems using data structures: Students will be able to use appropriate data structures to solve various problems such as searching, sorting, and graph algorithms.
5. Ability to design and implement complex data structures: Students will be able to design and implement complex data structures such as hash tables, B-trees, and priority queues.



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USIT303 Computer Networks

1. An understanding of the basics of computer networking, including the OSI and TCP/IP models.
2. Knowledge of different network topologies and architectures, including LAN, WAN, and MAN.
3. Familiarity with network protocols such as Ethernet, TCP/IP, HTTP, SMTP, and FTP.
4. The ability to design and configure networks, including sub netting and addressing schemes.
5. An understanding of network security concepts, including authentication, authorization, and encryption.
6. An understanding of wireless networking technologies such as Wi-Fi, Bluetooth, and cellular networks.
7. Knowledge of network management and monitoring tools.
8. An understanding of emerging networking technologies such as Software-Defined Networking (SDN) and Network Functions Virtualization (NFV).
9. The ability to troubleshoot network issues using various diagnostic tools.
10. The ability to work collaboratively in a team to design, implement, and maintain a network infrastructure.

USIT304 Database Management Systems

1. Upon completion of this course, students should be able to:
2. Understand the fundamental concepts of database management systems, including data modeling, database design, and relational databases.
3. Design and implement database schemas and tables using SQL, and perform various SQL operations such as selecting, inserting, updating, and deleting data.
4. Understand and apply the principles of normalization to ensure data integrity and eliminate data redundancy in database design.
5. Develop an understanding of data storage and retrieval techniques, including indexing, sorting, and hashing.
6. Understand the principles of database security, including access control, authentication, and authorization, and implement them in a database environment.
7. Analyze and evaluate the performance of database queries and transactions, and optimize them to improve system performance.



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USIT305 Applied Mathematics

1. We need to understand how Matrices are extensively used in solving the simultaneous system of equations.
2. To evaluate the operations with complex numbers and solve quadratic equations with complex numbers.
3. To enable the students to study the Laplace Transforms, properties of Laplace Transform, inverse Laplace Transform and some applications to solve the differential equations and integral equations.
4. To understand the primary purpose of the differential equation is the study of solutions that satisfy the equations and the properties of the solutions.
5. To understand Multiple integrals are evaluate double integrals for three dimensions. They are tool for adding up infinitely many infinitesimal quantities associated with points in a three-dimensional region.
6. We need to understand Beta and gamma are the two most popular functions which is used to solve problems in mathematics.

SYIT Semester IV

USIT401 Core Java

1. Understand the features of Java programming language and apply them to write basic programs.
2. Apply object-oriented programming concepts like inheritance, polymorphism, and encapsulation to design and develop robust software systems.
3. Evaluate the importance of exception handling in Java and create custom exceptions to handle errors.
4. Synthesize the concepts of multithreading, synchronization, and wait/notify methods to develop concurrent applications.
5. Create I/O streams to read and write data from/to files and serialize objects for storage and retrieval.
6. Understand the basics of networking in Java and create client-server communication programs using sockets.
7. Apply the concept of wrapper classes to convert primitive data types into objects and vice versa.
8. Evaluate the Collection Framework and its interfaces like List, Set, and Map to develop efficient data structures.
9. Synthesize the concept of inner classes and apply them to write nested and anonymous classes.
10. Create user interfaces using AWT components, layouts, and event handling mechanisms.

USIT402 Introduction to Embedded Systems

1. Understand the basics of embedded systems and their applications in various fields.
2. Design and develop embedded systems using various hardware and software tools.
3. Develop an understanding of the architecture, programming, and interfacing of microcontrollers.
4. Analyze and evaluate the performance of embedded systems using appropriate techniques and tools.
5. Develop skills in programming languages such as C and Assembly for microcontrollers.
6. Gain knowledge of real-time operating systems, task scheduling, and synchronization.
7. Design and develop simple embedded systems for various applications such as robotics,



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automation, and control systems.

8. Develop skills in debugging, testing, and optimizing embedded systems.
9. Develop skills in designing and developing communication protocols for embedded systems.
10. Gain an understanding of the security and safety issues in embedded systems and the techniques used to mitigate them.

USIT403 Computer Oriented Statistical Techniques

1. To understand measuring of Central Tendency. To present a brief picture of data: It helps in giving a brief description of the main feature of the entire data & Objective of measures of dispersion to judge the reliability of measures of central tendency.
2. To understand the basics of statistical computing and data analysis and How to use R for analytical programming.
3. To evaluate various aspects of a distribution, such as its central tendency, skewness, and kurtosis.
4. To apply the probability theory and solve the problems
5. To have knowledge in probability distributions and testing of hypothesis.
6. We need to understand how to calculate the value of the regression coefficient and least squares regression line given parts of the formula.
7. To obtain the optimum results, i.e., the maximum information about the characteristics of Population

USIT404 Software Engineering

1. Understand the fundamental concepts of software engineering, including software development processes, software requirements, and software design.
2. Develop an understanding of software development methodologies, including Waterfall, Agile, and DevOps, and understand the advantages and disadvantages of each.
3. Understand the principles of software project management, including project planning, estimation, and tracking, and develop skills in managing software development projects.

USIT405 Computer Graphics And Animation

- 1) Learner will be able to understand computer-aided engineering and design, in which objects are drawn and analyzed in computer programs.
- 2) Understanding the fundamental concepts of CG including image representation, raster graphics, vector graphics, 2D and 3D transformations.
- 3) Proficiency in using various computer graphics tools and software packages such as Photoshop, Autodesk Maya, Blender etc.
- 4) Ability to design and implement applications using programming languages such as C, C++ and Java.
- 5) Learners will be able to understand the different file formats.
- 6) Learners will be able to understand the concept of 2D and 3D.
- 7) They will be able to understand the techniques in animation.
- 8) They will learn about the different types of input and display devices.



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TYIT Semester V

USIT501 Software Project Management

1. Understand the principles and concepts of software project management and their applications in the software development process.
2. Develop an understanding of the different software development life cycle models, project planning, and management processes.
3. Understand the importance of requirements gathering and analysis, and the techniques used in these processes.
4. Develop skills in creating project plans, schedules, and budgets, and estimating resources and costs.
5. Gain knowledge of risk management and mitigation techniques, and the importance of quality assurance and control in software development.
6. Understand the different team structures, roles, and responsibilities in software development projects, and the techniques used in team management and communication.
7. Develop skills in project monitoring and control, including tracking progress, identifying issues, and implementing corrective actions.
8. Gain an understanding of the principles of software metrics and their applications in project management.
9. Develop skills in managing project stakeholders, including communication, negotiation, and conflict resolution.
10. Understand the importance of project documentation and reporting, and the techniques used in these processes.

USIT502 Internet Of Things

1. Understand the fundamental concepts of Internet of Things (IoT) and their applications in various domains.
2. Develop an understanding of the IoT architecture, including the physical layer, communication layer, and application layer.
3. Understand the different communication protocols used in IoT, including Wi-Fi, Bluetooth, Zigbee, and LoRaWAN.
4. Develop skills in programming languages such as Python and JavaScript for IoT devices.
5. Gain knowledge of various sensors and actuators used in IoT and their interfacing techniques.
6. Develop an understanding of cloud computing and its applications in IoT, including data storage, processing, and analysis.
7. Understand the importance of data privacy and security in IoT and the techniques used to ensure them.
8. Develop skills in designing and developing IoT systems for various applications such as smart homes, healthcare, and agriculture.
9. Gain an understanding of the ethical and social implications of IoT, including privacy, security, and environmental impact.



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USIT503 Advanced Web Programming

1. Understand the advanced concepts of web programming, including web architecture, web services, and web application frameworks.
2. Develop an understanding of the principles of web security, including authentication, authorization, and encryption.
3. Develop skills in server-side programming languages such as PHP and Node.js, and web application frameworks such as Laravel, Express, and Django.
4. Understand the different database management systems used in web applications, including MySQL, MongoDB, and PostgreSQL.
5. Develop skills in front-end web development using HTML, CSS, and JavaScript, and front-end frameworks such as React and Vue.js.
6. Understand the importance of web accessibility and the techniques used to ensure it.
7. Develop skills in designing and developing responsive and mobile-friendly web applications.
8. Understand the importance of web analytics and the techniques used to measure and analyze web application performance.
9. Gain knowledge of the latest trends and technologies in web programming, including Progressive Web Applications (PWA), Single-Page Applications (SPA), and Serverless Computing.
10. Develop skills in project management, including planning, execution, monitoring, and control of web development projects.

USIT504 Linux system Administration

1. Understand the advanced concepts of web programming, including web architecture, web services, and web application frameworks.
2. Develop an understanding of the principles of web security, including authentication, authorization, and encryption.
3. Develop skills in server-side programming languages such as PHP and Node.js, and web application frameworks such as Laravel, Express, and Django.
4. Understand the different database management systems used in web applications, including MySQL, MongoDB, and PostgreSQL.
5. Develop skills in front-end web development using HTML, CSS, and JavaScript, and front-end frameworks such as React and Vue.js.
6. Understand the importance of web accessibility and the techniques used to ensure it.
7. Develop skills in designing and developing responsive and mobile-friendly web applications.
8. Understand the importance of web analytics and the techniques used to measure and analyze web application performance.
9. Gain knowledge of the latest trends and technologies in web programming, including Progressive Web Applications (PWA), Single-Page Applications (SPA), and Server less Computing.



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USIT505 Enterprise Java

1. Understanding of Java EE architecture: Students should be able to understand the architecture and components of Java EE, including Servlets, JSPs, EJBs, and Hibernate.
2. Ability to develop web applications: Students should be able to develop web applications using Servlets, JSPs, and EJBs, including the ability to design and implement effective user interfaces, data models, and business logic.
3. Knowledge of database connectivity: Students should be able to connect to and manipulate databases using Hibernate, including the ability to perform CRUD (Create, Read, Update, Delete) operations and retrieve data using queries.
4. Knowledge of JSON: Students should be familiar with JSON (JavaScript Object Notation) and understand how to use it to transfer data between the client and server in web applications.
5. Familiarity with development tools: Students should be familiar with development tools commonly used in the industry, such as Eclipse or NetBeans, and understand how to use them to develop and debug Java EE applications.
6. Critical thinking and problem-solving: Students should be able to apply critical thinking and problem-solving skills to identify and troubleshoot issues in Java EE applications, including performance issues, security vulnerabilities, and errors in code.
7. Knowledge of best practices: Students should be familiar with best practices for Java EE development, including coding standards, design patterns, and testing methodologies.

TYIT Semester VI

USIT601 Software Quality Assurance

1. Understand the fundamental concepts of software quality assurance, including software testing, software metrics, and quality control.
2. Design and implement test cases and test plans, and perform various types of testing such as unit testing, integration testing, system testing, and acceptance testing.
3. Understand and apply different software testing techniques, such as white-box testing, black-box testing, and gray-box testing.
4. Analyze and evaluate software metrics, such as defect density, code coverage, and code complexity, and use them to assess the quality of software.
5. Understand the principles of quality control, including continuous integration, version control, and bug tracking, and apply them in a software development environment.
7. Understand the role of software quality assurance in software development, including quality standards, quality control processes, and quality improvement models.

USIT602 Security in Computing

1. Students will be able to apply fundamental principles of computer security, including confidentiality, integrity, and availability, to real-world scenarios.
3. Students will understand different types of threats and attacks, and evaluate their effectiveness against different security mechanisms.
5. Students will be able to evaluate the effectiveness of common security measures in protecting computer systems against attacks.



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7. 4. Students will create effective solutions to mitigate common vulnerabilities in computer
8. systems, including buffer overflows, SQL injection, and cross-site scripting (XSS).
9. 5. Students will be able to apply cryptographic techniques, including encryption,
10. decryption, and digital signatures, to protect data.
11. 6. Students will evaluate the effectiveness of network security mechanisms, including
12. firewalls, intrusion detection and prevention systems, and virtual private networks
13. (VPNs)

USIT603 business Intelligence

1. An understanding of the basics of business intelligence, including data warehousing, data mining, and data visualization.
2. Knowledge of various data sources, including transactional databases, data warehouses, and big data platforms.
3. Familiarity with different data modeling techniques such as dimensional modeling and entity-relationship modeling.
4. The ability to design and develop data warehouses using ETL (Extract, Transform, Load) tools.
5. Knowledge of various data mining techniques such as clustering, association rule mining, and decision trees.
6. An understanding of data visualization tools and techniques for creating interactive dashboards and reports. An understanding of business analytics, including descriptive, predictive, and prescriptive analytics.

USIT604 Principles of Geographic Information systems

1. Understand the fundamental principles of Geographic Information Systems (GIS) and their applications in various fields.
2. Use GIS software to create, manage, manipulate, analyze and visualize spatial data.
3. Develop a thorough understanding of spatial data models and projections, and the ability to transform data between coordinate systems.
4. Understand the concept of metadata and how to create and manage it.
5. Be able to select appropriate data sources, acquire and evaluate spatial data, and prepare data for analysis.
6. Develop an understanding of spatial analysis techniques, such as spatial queries, overlay analysis, and network analysis.
7. Gain proficiency in creating cartographic representations and visualizations of spatial data, including thematic maps and 3D visualizations.
8. Understand the role of GIS in decision-making, and how to use GIS to support decision-making processes.

USIT605 Cyber Laws

1. Understand the basic concepts and principles of cyber law and its importance in the digital age.
2. Identify and analyze the various legal issues related to cybercrime, cyber security, cyber privacy, and cyber ethics.
3. Develop an understanding of the legal framework governing electronic transactions, contracts, and digital signatures.



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4. Understand the legal provisions for data protection and privacy, including the General Data Protection Regulation (GDPR).
5. Analyze the impact of intellectual property laws on the digital world, including copyright, trademark, and patent laws.
6. Understand the legal provisions for cybercrime and cyber security, including the Computer Fraud and Abuse Act (CFAA) and the Cybersecurity Information Sharing Act (CISA).
7. Develop an understanding of the international legal framework for cyber law, including the Council of Europe Convention on Cybercrime.
8. Develop the ability to evaluate and analyze legal cases related to cyber law.



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