



Curriculum Document of
**INFORMATION SYSTEM STUDY
PROGRAMME (BACHELOR DEGREE)**

FACULTY OF ENGINEERING AND
VOCATIONAL

Universitas Pendidikan Ganesha
2021

**CURRICULUM OF
INFORMATION SYSTEM STUDY PROGRAMME
(BACHELOR DEGREE)**



**FACULTY OF ENGINEERING AND VOCATIONAL
UNIVERSITAS PENDIDIKAN GANESHA
2021**

A. IDENTITY

1	Name of Study Programme, Level	Information System, Bachelor Degree
2	Address	Udayana Street No.11, Banyuasri, Kec. Buleleng, Buleleng Regency, Bali 81116 Telp. (+62 362) 22570
3	Regency/City	Singaraja
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6	Fax Number	-
7	Email address	is@undiksha.ac.id
8	Website address	http://is.undiksha.ac.id
9	Degree given	Bachelor of Computer (S.Kom)
10	Year and Decree of Establishment	Decree of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 116/KPT/I/2018
11	Year and Decree of Accreditation	-

B. LEADERSHIP OF THE STUDY PROGRAMME

1	Name	I Made Ardwi Pradnyana, S.T., M.T.
2	Position	Coordinator of the Study Programme
3	Decree of Assignment	2831/UN48/KP/2019
4	Assignment start date	December 2, 2019
5	Assignment complete date	November 30, 2023

A. RATIONALE

The Information System Study Programme curriculum is designed to produce graduates who can compete globally and have a bachelor's degree qualification. The curriculum of the Information Systems Study Programme was developed as a response to the demands of the labor market in line with the implementation of the ASEAN free trade or the ASEAN economic community as stated in the *Rencana Strategis* (Renstra) or Strategic Plan of the Faculty of Engineering and Vocational.

Curriculum development of the Information System Study Programme is institutionally organized by the *Lembaga Pengembangan Pembelajaran dan Penjaminan Mutu Universitas Pendidikan Ganesha* (LPPPM UNDIKSHA) or Institute for Learning Development and Quality Assurance of UNDIKSHA. Curriculum Development of the Information System Study Programme refers to policies and the role of stakeholders both internally and externally. The curriculum of the Information System Study Programme refers to the Regulation of the Minister of Research and Higher Education Number 44/2015 concerning National Higher Education Standards, Law Number 12 of 2012 concerning the *Kerangka Kualifikasi Nasional Indonesia* (KKNI) or Indonesian National Qualifications Framework, Guidance Documents for Preparation of Higher Education Curriculum in Era 4.0 and Guide Documents for Curriculum Preparation Merdeka Belajar Kampus Merdeka (MBKM) or Freedom to Learn - Independent Campus, Computing Curricula Document in 2020, KKNI Curriculum Development Document Based on the 2020 OBE in Informatics and Computer Science compiled by the Association for Informatics and Computer Universities (APTIKOM), recommendations for the results of a graduate profile survey organized by the Association for Information Systems Indonesia (AISINDO), Statutes of UNDIKSHA, Vision and Mission of UNDIKSHA, Vision and Mission of the Faculty of Engineering and Vocational as well as the Vision and Mission of the study programme itself. The stakeholders involved are the curriculum development team and lecturers of the Information System Study Programme, reviewed and validated by experts in information systems science.

The curriculum development of the Information System Study Programme is based on the profile and *Capaian Pembelajaran Lulusan* (CPL) or Graduate Learning Outcomes. The CPL is then reduced to the body of knowledge, the formation of courses and the weight of the credits, the curriculum maps, the learning designs expressed in the form of *Rencana Pembelajaran Semester* (RPS) or Semester Lesson Plan, developing teaching materials, and developing assessment and

evaluation instruments. For its implementation, students are given the freedom to determine their studies through various programmes or activities that can be adjusted according to the subject's learning outcomes.

In particular, the curriculum of the Information System Study Programme refers to the Computing Curricula 2020 document, which states that the discipline of information systems is a discipline that studies various aspects when technology meets and interacts with social systems, namely organizations, companies, and society. Graduates of the Information System Study Programme are expected to have roles under these domains. Referring to this domain's roles of graduates of the Information System Study Programme are based on the agreement between the Association for Information Systems Indonesia (AISINDO), namely: data analyst, data architect, IT planning analyst, enterprise architect, enterprise application (focus on data warehouse), service desk analyst/manager, information systems consultant, IT-based business entrepreneur, chief information officer (CIO), information systems research assistant, competitive intelligence analyst, and UI/UX designer.

Based on this, the Information Systems Study Programme designs a curriculum that has the following characteristics:

1. Owns four groups of learning outcomes, namely attitudes, general skills, knowledge, and special skills distributed in related subjects to support the fulfillment of the graduate profile.
2. Owns field of study related to three domains: technology, organization or management, and people.
3. Enables students to carry out learning activities outside the study programme, both within the same university or outside the student's home university.

B. DESCRIPTION OF STUDY PROGRAMME PROFILE

The Information System Study Programme was established on February 2, 2018, through the Decree of the Minister of Research, Technology and Higher Education of the Republic of Indonesia Number 116/KPT/I/2018. In the 2020 MBKM curriculum, the Information System Study Programme offers three specializations: cyber security, information systems management, and engineering and business intelligence.

The MBKM curriculum in 2020 for the Information System Study Programme is designed to produce three profiles of graduates, namely information systems developers, information systems consultants, and database experts. Information systems developers can work as IS/IT Project Managers, System Analysts, Business Systems Analysts, System Designers, Application

Architects, information systems consultants can work as IS/IT Consultants, Practice Managers, Enterprise Architects, and ERP Specialists. In contrast, profiles of database expert graduates can work as Database Designer, Database Programmer, Database Administrator, Data Analyst, Data Warehouse Analyst, and Business Intelligence Analyst.

C. VISION AND MISSION

1. VISION

To become an Excellent Study Programme in developing science and technology in Information Systems based on the *Tri Hita Karana* (Three Causes to Prosperity) Philosophy in Bali and Nusa Tenggara in 2030.

2. MISSION

The missions of the Information System Study Programme are:

1. Organizing the best education and teaching in the field of information systems in order to produce graduates who are competent, competitive, and with character.
2. Organizing innovative and collaborative research to support the development and utilization of knowledge in information systems.
3. Organizing community service to optimize the use of IT for organizations and businesses, and the wider community.
4. Build and develop intensive and extensive collaboration with various organizations/agencies to increase collaboration in developing and utilizing scientific information systems.

D. OBJECTIVES

The objectives of the Information System Study Programme are:

1. Excellence in cybersecurity, information systems management, engineering and business intelligence (academic accomplishment).
2. Produce graduates who have good ethics, integrity and high commitment, and social responsibility (social accomplishment)
3. Produce graduates committed to developing knowledge for further learning formally and informally in supporting roles as information system developers, information systems consultants, and database experts (professional accomplishment).

E. PROFILE OF GRADUATE

Table 1. Profile of Graduates of the Information System Study Programme

Profile of Graduate	Description
1. Information System Developer.	• Able to play a role in designing, developing, and testing program code, implementing, integrating, and maintaining information systems. • Able to analyze user needs, design and model business processes, investigate technology needs and information systems developed to support organizational goals.
2. Information System Consultant	• Able to analyze the security of Applications and Information System Infrastructure in terms of Confidentiality, Integrity, Availability in business processes, data, and information in a professional and characterized manner. • Able to formulate IS/IT strategic planning and IT services that align with the organization's strategy, environmentally friendly for its competitive advantage. • Able to analyze, design, and propose solutions, investigate resource requirements, and implement and configure ERP according to organizational needs.
3. Database Expert	• Able to manage databases starting from planning, monitoring, improving performance, and testing the level of database security. • Able to transform data from a database into meaningful information and knowledge for business analysis and used as a basis for organizations' decision-making.

F. LEARNING OUTCOMES OF GRADUATES

Table 2. Graduate Learning Outcomes

1. ATTITUDE	
PO 1	Demonstrate scientific, educational, and religious attitudes and behaviors that improve the quality of life in society, nation, and state-based on academic norms and ethics based on the <i>Tri Hita Karana</i> values.
2. KNOWLEDGE	
PO 4	Able to identify, formulate, develop, and solve problems of information system needs of an organization.
PO 5	Able to apply the basic concepts of logic, discrete structures, statistics, and various programming language models to solve various computational problems.
PO 6	Able to apply project management concepts in developing information systems and apply information system management concepts that can support organizational and enterprise decision-making.
3. GENERAL SKILLS	

PO 2	Able to integrate learning and innovation skills, mastery of technology and information, career development, and life skills to become lifelong learners.
PO 3	Able to apply logical, critical, systematic, and innovative thinking in the development or implementation of science and technology that pays attention to and applies humanities values following their field of expertise.
4. SPECIAL SKILLS	
PO 7	Able to integrate algorithmic concepts and computational mathematics into various programming languages to develop information systems according to organizational/business needs.
PO 8	Able to integrate evaluation methodologies and security standards in the implementation of organizational Information systems
PO 9	Able to build intelligent systems on certain platforms to be able to explore meaningful knowledge as a basis for decision making and business solutions for organizations. (Special skill)
PO 10	Able to analyze the quality of information systems, information technology investment techniques, IT governance, control, and auditing in line with organizational strategy. (Special skill)
PO 11	Able to apply information technology, IS/IT architectural concepts, IS/IT master plan concepts, IS/IT service management in businesses and organizations by following future trends and being environmentally friendly

G. LEARNING PROCESS

Learning is defined as a process of student interaction with lecturers and learning resources in a learning environment, which is the actual implementation of the curriculum (actual curriculum) that the study programme has prepared. The learning implementation must meet the learning process and learning assessment standards stipulated in Permendikbud No. 3 of 2020 concerning *Standar Nasional Pendidikan Tinggi* (SNPT) or National Higher Education Standards. The learning process in the Information System Study Programme refers to the guidelines for the Determination of Learning Methods and Media Strategies that use the stipulation of the Rector's Decree No. 3029/UN48/DK/2020. The selection of forms, learning methods, and estimation of study time refers to article 17 of the SN-DIKTI shown in table 3.

Table 3. Learning Forms and Estimated Study Time

Understanding 1 credit in the form of Learning		Total hours
a	Lecture, Response, Tutorial	

	Face to face	Structured Assignments	Independent Learning	
	50 minutes/week/semester	60 minutes/week/semester	60 minutes/week/semester	2,83
b	Seminars or other similar forms of learning			
	Face to face	Independent Learning		
	100 minutes/week/semester	70 minutes/week/semester		2,83
c	Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Design or Development, Community Service, or other equivalent forms of learning			
	170 minutes/week/semester			2,83

Time is a measure of the student's learning load required following the *Capaian Pembelajaran Lulusan* (CPL) or Programme Outcome (PO) to be achieved. The next time is converted into credit units, where one credit is equivalent to 170 minutes per week per semester. Meanwhile, one semester consists of 16 weeks, including the *Ujian Tengah Semester* (UTS) or mid-semester exam and the *Ujian Akhir Semester* (UAS) or final semester exam. The determination of the length of time at each stage of learning is based on an estimate that in the time provided, the average student can achieve the specified ability through learning experiences designed at that stage of learning.

The learning approach used is a student-centered learning (SCL) approach. Learning with this approach or paradigm is carried out in various forms of learning, learning methods, and student assignments to gain learning experiences in accordance with the PO imposed on courses in curricular learning activities. The learning method is the stages of learning that are planned systematically through certain learning strategies to achieve student learning outcomes (a way of achieving learning outcomes). Learning methods that can be used are group discussions, simulations, case studies, collaborative learning, cooperative learning, project-based learning, problem-based learning, or other learning methods, which can effectively fulfill graduate learning outcomes. The form and method of learning are chosen effectively to suit the characteristics of the course to achieve certain abilities specified in the course in a series of fulfilling the learning outcomes of graduates. Examples of the selection of forms, methods, and learning assignments are shown in table 4.

Table 4. Learning Forms and Methods

No	Learning Form	Learning Methods	Assessment type
1	Face to face	1) case study	Problem-solving

		2) group discussion	
2	Practicum and Practice	Project-based learning	Create a specific project
3	Field practice	1) Problem-based learning 2) Collaborative learning 3) group discussion	Create a problem-solving portfolio

The learning process at UNDIKSHA is regulated in several procedures to take place effectively and responsibly, which means that it effectively transfers knowledge towards learning outcomes. Accountable in learning management (lecturers' presence, students' attendance, conformity of schedule, and others). The implementation of learning involves human resources (lecturers, students, education staff, leaders), study materials (reference books, textbooks, modules, etc.), facilities/infrastructure (classrooms, laboratories, LCD viewers, hotspots, information systems, e-learning, etc.), Regulations (Curriculum Guidelines, SOPs, Academic Calendar, Class Schedule, etc.). The learning process cycle is carried out periodically every semester, where in one semester, there are 14-16 weeks of lectures. This time is used for face-to-face lectures, practicum, and exams (mid-test/final-test).

Table 5. Learning Outcomes of Courses and Learning Experience

Code of CLO - Course Outcome	Learning Experiences
CLO 4.1 Students explain the components of the operating system. CLO 4.2 Students explain computer hardware CLO 4.3 Students explain how the operating system does the process. CLO 4.4 Students explain the relationship between hardware, software, and brainware.	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 5.1 Students can explain various concepts of algorithms and data structures correctly CLO 5.2 Students can use programming languages according to the rules and syntax fluently CLO 5.3 Students can arrange algorithmic flow according to the problem correctly CLO 5.4 Students can implement the arrangement of algorithms into a programme correctly	Project-based Learning, Individual Learning, Group Work, Blended Learning
CLO 6.1 Students can explain the basic concepts of management information systems correctly CLO 6.2 Students can explain the role of management information systems in making decisions correctly CLO 6.3 Students can describe various decision-making techniques in management information systems correctly CLO 6.4 Students can explain the role of database systems, information, and communication technology in management information systems appropriately	Blended Learning, Individual Learning, Group Work, Case-based Learning

CLO 7.1 Students can produce business process model documents for specific organizational case studies appropriately CLO 7.2 Students can produce business process analysis documents using qualitative methods for certain organizational cases appropriately CLO 7.3 Students can produce business process analysis documents using quantitative methods for certain organizational cases appropriately CLO 7.4 Students can demonstrate business process redesign simulations for specific organizational cases appropriately	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 8.1 Students can explain types of logic clearly CLO 8.2 Students can decipher the number system clearly CLO 8.3 Students can explain the concept of logic gates clearly CLO 8.4 Students can explain canonical concepts clearly	Individual Learning, Group Work, Blended Learning
CLO 17.1 Students explain the components, forms, and transmission of computer networks. CLO 17.2 Students explain how TCP/IP and OSI Layer work. CLO 17.3 Students explain the IP Subnetting process and its effects. CLO 17.4 Student demonstrates routing packets on the network	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 18.1 Students can explain the concept of functions and procedures correctly CLO 18.2 Students can implement search schemes on arrays correctly CLO 18.3 Students can explain the concept of pointers correctly CLO 18.4 Students can apply various advanced data structures appropriately	Project-based Learning, Individual Learning, Group Work, Blended Learning
CLO 19.1 Students can correctly identify functional and non-functional software requirements CLO 19.2 Students can apply various types of object-oriented diagram models clearly CLO 19.3 Students can clearly describe the software interface CLO 19.4 Students can analyze software testing appropriately	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 20.1 Students can master database concepts well CLO 20.2 Students can properly design relational databases with Entity Relationship Diagrams CLO 20.3 Students can perform database normalization well CLO 20.4 Students can develop databases with good SQL language	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 21.1 Students can explain the basic concepts of systems and information on software correctly CLO 21.2 Students can analyze system requirements and information on software correctly CLO 21.3 Students can clearly describe the results of business process analysis using flow chart diagrams CLO 21.4 Students can apply various structured diagram models in software appropriately	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 22.1 Students can explain the basic theory of enterprise information systems, SCM, ERP, and CRM correctly CLO 22.2 Students can demonstrate an enterprise database on an enterprise system correctly CLO 22.3 Students can properly design enterprise information systems CLO 22.4 Students can evaluate enterprise information systems correctly	Blended Learning, Individual Learning, Group Work, Project-based Learning

CLO 23.1 Students can explain various concepts of information system security correctly CLO 23.2 Students can demonstrate security in an information system correctly CLO 23.3 Students can compare attacks on information systems correctly CLO 23.4 Students can explain the types of attacks on information systems correctly	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 24.1 Students can master object-oriented programming paradigms well CLO 24.2 Students can explain the terminology, concepts of object-oriented programming using ALICE CLO 24.3 Students can master the terminology, syntax, and steps necessary to create basic Java programs using the Greenfoot interactive development environment well CLO 24.4 Students can implement object-oriented programming in the Java language.	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 25.1 Students can explain the concept of web-based programming correctly CLO 25.2 Students can create static websites using HTML well CLO 25.3 Students can properly design the appearance of website pages using CSS. CLO 25.4 Students can create a dynamic website using PHP, HTML, and CSS CLO 25.5 Students can develop a website to solve problems according to the case study properly	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 26.1 Students can describe IS/IT project management concepts appropriately CLO 26.2 Students can describe project management process groups and project management knowledge areas appropriately CLO 26.3 Students can apply project management knowledge areas in project management practices in the IS/IT field at the initiation and project planning phases correctly CLO 26.4 Students can apply project management knowledge areas in project management practices in the IS/IT field in the proper implementation, control, and closing phases of projects	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 27.1 Students can explain the concept of the relational database development cycle CLO 27.2 Students can implement the query language properly and correctly. CLO 27.3 Students can explain database administration well. CLO 27.4 Students can explain data warehousing for data analysis well CLO 27.5 Students can implement non-relational databases	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 28.1 Students can explore descriptive statistical concepts clearly CLO 28.2 Students can explore the concept of inferential statistics clearly CLO 28.3 Students can explain data processing correctly CLO 28.4 Students can explore the concept of sampling clearly CLO 28.5 Students can apply statistical tests correctly	Problem-based Learning, Individual Learning, Group Work, Blended Learning
CLO 29.1 Students can explain the basic terms and concepts related to information technology services appropriately CLO 29.2 Students can explain the structure of tasks and main functions of information technology services accurately	Blended Learning, Individual Learning, Group Work,

CLO 29.3 Students can explain the information technology service life cycle accurately CLO 29.4 Students can produce IT service documents based on the ITIL framework well CLO 29.5 Students can explain recommendations for ITIL implementation strategies that can be adopted by the organization so that it can run well	Project-based Learning
CLO 30.1 Students can properly analyze a system based on usability and user experience principles CLO 30.2 Students can analyze the needs of users of a system appropriately CLO 30.3 Students can clearly describe user personas based on the results of user needs analysis CLO 30.4 Students can apply the concept of user-centered design in designing a prototype of a system clearly CLO 30.5 Students can implement evaluation techniques to test the system prototype design properly	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 31.1 Students can explain E-Business CLO 31.2 Students can describe the concept of E-Business CLO 31.3 Students can explain E-Business infrastructure CLO 31.4 Students can demonstrate strategies in E-Business CLO 31.5 Students can design a business in the context of E-Business	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 32.1 Students explain the use of GIT. CLO 32.2 Student demonstrates the Dart programming language. CLO 32.3 Students demonstrate the use of the Flutter framework CLO 32.4 Student demonstrates publication of Apps.	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 33.1 Students can describe the basic concepts of business intelligence correctly CLO 33.2 Students can describe the aspects and architecture of the business intelligence framework correctly CLO 33.3 Students can apply the stages of business process analysis as a step in planning business intelligence as an appropriate organizational business solution CLO 33.4 Students can display data visualization using business intelligence tools appropriately	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 34.1 Students can apply formulas to calculate investment returns CLO 34.2 Students can analyze cost allocation for IT projects CLO 34.3 Students can analyze the tangible and intangible IT assets of an organization CLO 34.4 Students can analyze organizational benefits in IT investment and organizational benefits in IT investment	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 35.1 Students can explain the basic concepts of enterprise IS/IT architecture, including methods, frameworks, and basic enterprise architecture approaches for organizations well CLO 35.2 Students can explain enterprise architecture analysis techniques used to optimize the effectiveness of business processes in organizations properly CLO 35.3 Students can explain the basics, principles, structures, and key points of the TOGAF framework as an enterprise architecture approach for organizations well	Blended Learning, Individual Learning, Group Work, Project-based Learning

CLO 35.4 Students can explain the stages, components, storage, and management of the TOGAF architecture in the context of developing organizational TOGAF documents properly CLO 35.5 Students can produce enterprise architecture documents based on the TOGAF framework for certain organizational cases well	
CLO 36.1 Students can analyze the concepts, structures, and processes of IT governance in an organization CLO 36.2 Students can identify IT governance framework CLO 36.3 Students can evaluate information technology governance in organizations. CLO 36.4 Students can analyze and align business processes and information technology.	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 37.1 Students can explain cases of crimes in the IT sector and cases of violations of the ITE Law which are given well CLO 37.2 Students can demonstrate professionalism and certification in the IS/IT field, as well as IS/IT professional organizations with an agreed code of ethics that IS/IT professionals should know well CLO 37.3 Students can explain ethics in IT business that organizations must know well	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 38.1 Students can identify leadership styles, communication techniques, and self-management appropriately CLO 38.2 Students can clearly explain the characteristics of leaders, basic concepts of communication, and self-management concepts CLO 38.3 Students can implement basic leadership skills, communication in delivering messages and dimensions of emotional intelligence well	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 39.1 Students can explain the concept of green IT/IS that organizations must know well CLO 39.2 Students can explain the concept of managing IT assets well for organizations CLO 39.3 Students can produce a green IS transformation roadmap document for certain organizational cases well	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 41.1 Students can describe the concepts of computer systems and society, as well as the development of computers appropriately CLO 41.2 Students can describe the use of computers in society and various fields appropriately CLO 41.3 Students can prepare proposals for using computers in the community well	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 42.1 Students can explain the concept of E-Commerce CLO 42.2 Students can compare E-Commerce Technology CLO 42.3 Students can demonstrate the Mechanisms and Processes of E-Commerce CLO 42.4 Students can explain the application form in E-Commerce CLO 42.5 Students can design E-Commerce	Flipped Classroom, Problem-based Learning
CLO 43.1 Students can develop a concept of a business idea CLO 43.2 Students can create a business model canvas (BMC) CLO 43.3 Students can make a business plan proposal for a startup CLO 43.4 Students can create a minimum viable product (MVP) for a startup	Blended Learning, Individual Learning, Group Work, Project-based Learning

CLO 49.1 Students can correctly demonstrate the operational technicalities of the research stages CLO 49.2 Students can demonstrate data collection techniques and tools, the validity of sampling data, and proper data analysis CLO 49.3 Students can demonstrate techniques for writing scientific papers and research proposals correctly CLO 49.4 Students can properly prepare scientific papers and research proposals	Blended Learning, Individual Learning, Case-based Learning
CLO 50.1 Students know ERP components CLO 50.2 Students know the types of ERP software CLO 50.3 Students can identify ERP modules CLO 50.4 Students analyze the function of ERP software in an organization.	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 51.1 Students can understand the concepts and benefits of an information system audit CLO 52.2 Students can understand the stages of implementing an Information System Audit CLO 53.3 Students can perform Audit procedures on IT Applications and Infrastructure CLO 54.4 Students can identify and verify recommendations for follow-up on information systems audits	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 52.1 Students can describe the concepts and functions of integrated quality management in organizations CLO 52.2 Students can analyze the framework to measure quality. CLO 52.3 Students can analyze user or consumer behavior CLO 52.4 Students can evaluate the quality of information systems using various frameworks.	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 53.1 Students can describe the concept of IT risk management appropriately CLO 53.2 Students can identify risks under the concept of risk management in the use of information technology to reduce the impact of risks that may occur appropriately CLO 53.3 Students can manage risk per the concept of risk management in the use of information technology to be able to reduce the impact of risks that may occur appropriately	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 54.1 Students can explain the principles of e-government, smart city, smart village, and phases of e-government development appropriately CLO 54.2 Students can correctly demonstrate the principles of e-government, smart city, smart village, and e-government development phases CLO 54.3 Students can properly prepare e-government master plans CLO 54.4 Students can identify e-government, smart city, and smart village correctly	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 55.1 Students can explain the concept of aligning information systems strategy and business strategy to ensure proper organizational continuity CLO 55.2 Students can explain the impact of implementing information systems on organizations and the strategic role of information systems for organizations to be able to compete well in the competition in the industrial world CLO 55.3 Students can explain the risks that must be faced by the organization towards the implementation of the organization's information system strategy properly	Blended Learning, Individual Learning, Group Work, Project-based Learning

CLO 55.4 Students can explain the stages in strategic planning of information systems for organizations well CLO 55.5 Students can produce IS/IT strategic planning documents for certain organizational cases well	
CLO 56.1 Students can explain the concept of expert systems clearly CLO 56.2 Students can implement methods in expert systems appropriately CLO 56.3 Students can explain the concept of a decision support system clearly CLO 56.4 Students can implement methods in a decision support system appropriately	Project-based Learning, Individual Learning, Group Work, Blended Learning
CLO 57.1 Students can explain the concept of data mining correctly CLO 57.2 Students can use data mining estimation and classification techniques to predict data well CLO 57.3 Students can use data mining association and clustering techniques to describe data properly CLO 57.4 Students can make data mining applications to solve problems correctly.	Blended Learning, Individual Learning, Group Work, Problem-based Learning
CLO 58.1 Students can explain the concept of a data warehouse correctly CLO 58.2 Students can design a data warehouse properly CLO 58.3 Students can explain data warehouse modeling correctly CLO 58.4 Students can create a data warehouse for OLAP purposes properly	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 59.1 Students can describe the concept of ethical hacking. CLO 59.2 Students can demonstrate tools for conducting Information Gathering. CLO 59.3 Students demonstrate the search for Vulnerabilities and Exploit in the IS/IT infrastructure. CLO 59.4 Students demonstrate Post Exploitation after the Exploitation process has been successfully carried out on the IS/IT infrastructure.	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 60.1 Students can demonstrate vulnerability risk testing on data. CLO 60.2 Students can demonstrate risk testing of Information System application vulnerabilities. CLO 60.3 Students can demonstrate exploitation of risks found in IS/IT infrastructure	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 61.1 Students can explain the concept of Firewall, IDS, and Digital Forensics correctly CLO 61.2 Students can identify evidence of crime with Digital Forensics correctly CLO 61.3 Students can demonstrate Firewall and IDS correctly	Blended Learning, Individual Learning, Group Work, Case-based Learning
CLO 62.1 Students can describe the concept and scope of enterprise system integration appropriately CLO 62.2 Students can explain the characteristics and components of enterprise system integration correctly CLO 62.3 Students can choose the right ERP software package that is already available CLO 62.4 Students can formulate ERP system design requirements properly	Blended Learning, Individual Learning, Group Work, Project-based Learning
CLO 63.1. Students can explain the basic concepts of framework-based web programming correctly CLO 63.2. Students can use the concepts of views, routing, and controllers in the Laravel framework well	Blended Learning, Individual Learning, Group Work,

CLO 63.3. Students can create static websites using the Laravel framework well CLO 63.4 Students can use the concept of the query builder, model, migration, and eloquence in the Laravel framework well. CLO 63.5. Students can create dynamic websites using the Laravel framework well	Project-based Learning
CLO 64.1. Students can explain the concept of testing and implementing information systems appropriately CLO 64.2. Students can use BlackBox and white-box testing techniques in the testing process correctly CLO 64.3. Students can design software implementation with the PERT technique correctly. CLO 64.4. Students can explain the stages and processes of software implementation correctly	Blended Learning, Individual Learning, Group Work, Problem-based Learning

3) ASSESSMENT

The assessment system applied in the Information System Study Programme refers to the following main provisions:

1. Minister of Education and Culture of the Republic of Indonesia Decree Number 3 of 2020 concerning National Standards for Higher Education.
2. Guidelines for implementing UNDIKSHA Strategies, Methods, and Media in 2020.

Based on these two provisions, an assessment of the learning process and student learning outcomes is carried out. Assessment of the learning process (managerial assessment) in the form of a summative assessment model is carried out to determine the effectiveness of the learning process that has been held. Assessment of learning outcomes (substantive assessment) in the form of a formative assessment model is carried out to determine the achievement of competencies or learning outcomes built by students. Both forms of assessment include the following components:

1. Valuation Principle

The assessment principles include educative principles (an assessment that motivates students to be able to improve planning and learning methods and achieve graduate learning outcomes), authentic (assessment oriented to a continuous learning process and learning outcomes that reflect students' abilities during the learning process), objective (assessment based on standards agreed upon between lecturers and students and free from the influence of the subjectivity of the assessor and who is being assessed), accountable (assessment carried out according to clear procedures and criteria, agreed upon at the beginning of the lecture, and understood by students), and transparent (assessment) whose assessment procedures and results are accessible to all stakeholders) which is carried out in an integrated manner.

2. Assessment Techniques and Instruments

In addition to referring to the two provisions, the assessment techniques and instruments used are adjusted to the expected learning outcomes in each course in the Information System Study Programme, summarized in table 6.

Table 6. Assessment Techniques and Instruments

No .	Assessment Methods and Techniques	Definition	Instrument
1.	Non-test: Observation	Assessment techniques to collect information about student learning activities in participating in learning carried out by lecturers can be used by lecturers themselves or by students to observe each other	observation sheet
2.	Written test	Tes yang diberikan kepada testee yang harus dijawabnya secara tertulis pada lembar jawaban	test sheet
3.	Oral test	Bentuk tes formal yang dilaksanakan secara lisan atau tidak tertulis baik perintah maupun jawabannya	test sheet
5.	Portfolio Assessment	Bentuk penilaian terhadap berkas dokumen hasil karya mahasiswa secara berkesinambungan	Portfolio
6.	Performance Assessment	Bentuk penilaian terhadap kemampuan mahasiswa dalam mendemonstrasikan maupun mengaplikasikan suatu tugas/aktivitas sesuai dengan prosedur dan kriteria tertentu	Scoring rubric
7.	Project Assessment	Bentuk penilaian terhadap suatu tugas yang harus dikerjakan dalam periode atau jangka waktu tertentu	Scoring rubric
8.	Product Assessment	Bentuk penilaian terhadap kemampuan mahasiswa dalam menghasilkan produk tertentu	Scoring rubric

3. Learning Assessment Mechanisms and Procedures

The lecturer/lecturers prepare an assessment plan in the form of stages, techniques, instruments, criteria, indicators, and assessment weights outlined in the RPS or *Rencana Pembelajaran Semester* (Semester Lesson Plan), then submitted and agreed upon during the lecture contract. The assessment planning includes elements of learning achievement of attitudes, knowledge, general skills, and special skills using the assessment techniques and instruments.

4. Assessment Implementation

The assessment is implemented according to the lesson plan and can be done by:

- a. supporting lecturers or a team of lecturers;
- b. supporting lecturers or a team of lecturers by involving students; and/or
- c. supporting lecturers or a team of lecturers by involving relevant stakeholders.

5. Valuation Reporting

In the assessment process, the lecturer/lecturer team is required to provide feedback on the assessment results to students, including returning the results of student work, providing comments on student work directly or through Learning Management Media (e-Learning). Reporting the final assessment results stated in the student's success qualification using the conversion guidelines and graduation limits. Lecturers upload scores to the academic information system (SIAK/SIAK-NG). In the final stage, the lecturer/lecturer team administers all the assessment results that have been carried out.

6. Graduation

The weight of the assessment used:

- a. Assessment of the learning process (60%):
 - i. Assessments = 40%
 - ii. Attitude and participation = 20%
- b. Assessment of learning outcomes (40%):
 - i. UTS (Middle Semester Test) = 15%
 - ii. UAS (Final Semester Test)= 25%

Students' success in completing each course is determined by the final grade and its conversion, referring to the provisions in Table 7.

Table 7. Rating Weight

Percentile Score	Scale Value	Letter Value
85-100	4.00	A
81-84	3.75	A-
77-80	3.25	B+
73-76	3.00	B
69-72	2.75	B-
65-68	2.50	C+
61-64	2.00	C
40-60	1.00	D
0-39	0	E

Outcomes, types of assessments, and timing of assessments in the information system curriculum are shown in table 8.

Table 8. Type and Time of Outcome Assessment

Outcomes	Kinds of Assessment	Time
PEOs	- Employer satisfaction survey - Alumni Survey	Few years after graduation
PLO	Instructor evaluation report	Upon graduation

	- Department/Study Program performance Report - Student exit survey	
CLOs	Direct assessment - End of the course assessment - Semester performance report - Students report/comments	Upon course completion

4) CURRICULUM STRUCTURE

The group of courses in Information System studies consists of the following groups:

Table 9. Classification of Subjects and Credits

No	Course	Credits
1	MKWU (General Compulsory Courses)	10
2	MKIK/MKBS (Field of Study Courses)	114
3	MKIP (Supporting Science and Technology Courses)	30
4	MKPP/MKPI (Courses that Characterize Study Programs/Institutions)	2
Total		156

1. The General Compulsory Courses (MKWU) as Bahasa Indonesia, Religion, Pancasila, Civic Education, and English weights 2-semester credit units, each offered in Semester 1 and 2, with a total of 10-semester credit units.

Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120101	Bahasa Indonesia	2	2							
SIFS120102	Pancasila	2	2							
SIFS120201	English	2		2						
SIFS120202	Civic Education	2		2						
	Religion	2		2						
SIFS120203	- Hinduism - Islam - Buddhism - Protestant Christianity - Catholic Christianity - Confucianism									
SIFS120204										
SIFS120205										
SIFS120206										
SIFS120207										
SIFS120208										
	Total	10	4	6	0	0	0	0	0	0

2. The course that characterizes Study Programmes/Institutions (MKPP/MKPI) is *Tri Hita Karana* (THK), or Three Causes to Prosperity, with a weight of 2-semester credit units.

Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120103	Tri Hita Karana	2	2							

	Total	2	2	6	0	0	0	0	0	0
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3. Field of Study Courses (MKIK/MKBS) offered in Semesters 1 through 4 are a total of 80-semester credit units. Total Field of Study Courses with thesis is 73-semester credit units.

Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120104	Operation System	3	3							
SIFS120105	Algorithm and Programming	3	3							
SIFS120106	Concept of Information System	2	2							
SIFS120107	Analysis of Business Process	3	3							
SIFS120108	Informatics Logic	3	3							
SIFS120209	Computer Network	3		3						
SIFS120210	Programming and Data Structure	3		3						
SIFS120211	Software Engineering	3		3						
SIFS120212	Database Design	3		3						
SIFS120213	Software Analysis and Design	3		3						
SIFS120214	Enterprise Information System	3		3						
SIFS120301	Information System Security	3			3					
SIFS120302	Object-oriented Programming	3			3					
SIFS120303	Web-based Programming	3			3					
SIFS120304	IS/IT Project Management	3			3					
SIFS120305	Database Management	3			3					
SIFS120307	IT Service Management	3			3					
SIFS120308	User Experience Design	3			3					
SIFS120401	E-Business	3				3				
SIFS120402	Mobile Programming	3				3				
SIFS120403	Business Intelligence	3				3				
SIFS120404	IS/IT Investment Management	3				3				
SIFS120405	IS Architecture/IT Enterprise	3				3				
SIFS120406	IS/IT Governance	3				3				
SIFS120409	Green Information System	2				2				
	Total		1	1	2	2	0	0	0	0
		73	4	8	1	0				

4. Interdiscipline courses are included in MKIP, namely courses that do not have prerequisites. Interdiscipline courses must be taken by students of study programmes offered by other study programmes within universities. These courses are named Interdiscipline Courses I, II, and III. Learning Outside Study Programmes in UNDIKSHA Higher Education with a study load (equivalent) of 9 credits according to the interests and

talents or skills required by students with the following (optional) conditions:

- a. Students are free to choose the Constitutional Court according to their interests and talents;
- b. Students choose the Constitutional Court related to the knowledge and skills that can support the internship programme that will be chosen later;
- c. The implementation of points a and b is coordinated by the academic supervisor and Study Programmes' coordinator so that the course taken by students is attempted to match the knowledge of the study programme and its internship programme.

The study programme offers three courses (marked with *) with a total load of 9 credits to be taken by students outside the study programme.

Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120306	Statistics	3			3					
SIFS120407	Information System Business and Profession Ethics	2				2				
SIFS120408	Leadership and Interpersonal Skills	2				2				
SIFS120501	Community Engagement						4			
SIFS120502	Computers and society*	3					3			
SIFS120503	E-Commerce*	3					3			
SIFS120504	Technopreneurship*	3					3			
	Interdiscipline courses I	3					3			
	Interdiscipline courses II	3					3			
	Interdiscipline courses III	3					3			
SIFS120505	English for IT Business Communication	2					2			
SIFS120506	English for Academic Scientific Writing	2					2			
SIFS120507	IS Research Methods	3					3			
	Total	36	0	0	3	4	29	0	0	0

5. Elective courses are courses offered by the study programme to be chosen by students and are expected to be in accordance with the specialization offered. The selected courses are a minimum of 14 credits. Students are expected to choose courses that are under the available specializations, namely Elective Concentration Courses in *Manajemen Sistem Informasi* (MSI) or Information Systems Management, *Rekayasa dan Intelegensi Bisnis* (RIB) or

Engineering and Business Intelligence, and *Keamanan Siber* (KS) or Cyber Security. The study programme also offers elective courses not included in one of the available specializations called *Mata Kuliah Pilihan Umum* (MKPU) or General Elective Courses. The group of subjects according to the concentration in the Information System Study Programme is shown in table 10.

Table 10. Group of Concentration Courses

No	Concentration	Subject
1	Information Systems Management	IS/IT Project Management, IT Service Management, IS/IT Investment Management, IS/IT Governance, Enterprise Resource Planning, Information Systems Audit, IS/IT Quality Management, IT Risk Management, E-Government, IS/IT Strategic Planning
2	Engineering and Business Intelligence	Database Design, Database Management, Statistics, Business Intelligence, Decision Support Systems, Data Mining, and Data Warehouse
3	Cyber Security	Operating Systems, Computer Networks, Information System Security, IS/IT Enterprise Architecture, Ethical Hacking, Penetration Testing, and Security Operation Center.

Mata Kuliah Pilihan Umum (MKPU) or General Elective Courses										
Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120613	Enterprise System Integration	3						3	3	
SIFS120614	Framework-Based Web Programming	3						3	3	
SIFS120615	IS Testing and Implementation	2						2	2	
	Total	8						8	8	

Mata Kuliah Pilihan Konsentrasi-Manajemen Sistem Informas (MKPK-MSI) or Elective Concentration Course - Information Systems Management										
Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120601	Enterprise Resource Planning	2						2	2	
SIFS120602	Information System Audit	2						2	2	
SIFS120603	IS/IT Quality Management	3						3	3	
SIFS120604	IT Risk Management	2						2	2	
SIFS120605	E-Government	3						3	3	

SIFS120606	IS/IT Strategic Planning	3						3	3	
	Total	15						15	15	

Mata Kuliah Pilihan Konsentrasi-Rekayasa dan Intelegensi Bisnis (MKPK-RIB) or Elective Concentration Courses-Engineering and Business Intelligence										
Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120607	Decision Support System	3						3	3	
SIFS120608	Data Mining	3						3	3	
SIFS120609	Data Warehouse	3						3	3	
	Total	9						9	9	

Mata Kuliah Pilihan Konsentrasi-Keamanan Siber (MKPK-KS) or Concentration-Cyber Security Elective Course										
Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120610	Ethical Hacking	3						3	3	
SIFS120611	Penetration Testing	3						3	3	
SIFS120612	Security Operation Center	3						3	3	
	Total	9						9	9	

6. *Kuliah Kerja Nyata (KKN)*, or Community Engagement Programme, is one of the compulsory subjects at UNDIKSHA, which aims to give students direct experience in applying and integrating the knowledge they have mastered to solve problems in society. KKN is carried out in semesters between 4 and 5

Course Code	Course	Credits	Semester							
			1	2	3	4	5	6	7	8
SIFS120501	Community Engagement	4					4			
	Total	4	0	0	0	0	4	0	0	0

7. Fieldwork is one of the compulsory subjects at UNDIKSHA, which aims to give students direct experience in applying and integrating the knowledge they have mastered to solve problems in the industrial world/work world. Fieldwork can be taken by students in semester 6 or 7. The choice of fieldwork schemes offered refers to the 8 types of activities listed in the Merdeka Belajar Kampus Merdeka (MBKM) or Freedom to Learn - Independent Campus guide.

Year 1		Year 2		Year 3		Year 4	
1 st Semester	2 nd Semester	3 rd Semester	4 th Semester	5 th Semester	6 th Semester	7 th Semester	8 th Semester
Operating system (3)	Computer network (3)	Information System Security (3)	E-Business (3)	Community Engagement (4)	Enterprise Resource Planning (2)	Enterprise Resource Planning (2)	Thesis(6)
Algorithms and Programming (3)	Programming and Data Structure (3)	Object-Oriented Programming (3)	Mobile Programming (3)	Computers and society (3)*	Information System Audit (2)	Information System Audit (2)	
Information System Concept (2)	Software engineering (3)	Web-Based Programming (3)	Business Intelligence (3)	E-Commerce (3)*	IS/IT Quality Management (3)	IS/IT Quality Management (3)	
Business Process Analysis (3)	Database Design (3)	IS/IT Project Management (3)	IS/IT Investment Management (3)	Technopreneurship (3)*	IT Risk Management (2)	IT Risk Management (2)	
Informatics Logic (3)	Software Analysis and Design (3)	Database Management (3)	Enterprise IS/IT Architecture (3))	Interdiscipline Course I (3)	E-Government (3)	E-Government (3)	
Bahasa Indonesia (2)	Enterprise Information System (3)	Statistics (3)	IS/IT Governance (3)	Interdiscipline Course II (3)	IS/IT Strategic Planning (3)	Strategic Planning SI/TI (3)	
Pancasila (2)	English (2)	IT Service Management (3)	Ethics in Business and IS Professional(2)	Interdiscipline Course III (3)	Decision Support System (3)	Decision Support System (3)	

<i>Tri Hita Karana</i> (2)	Civic Education (2)	User Experience Design (3)	Leadership and Interpersonal Skills (2)	English for IT Business Communication (2)	Data Mining (3)	Data Mining (3)	
	Religion (2 credits)		Green Information System (2)	English for Academic Scientific Writing (2)	Data Warehouse (3)	Data Warehouse (3)	
				IS Research Methods (3)	Ethical Hacking (3)	Ethical Hacking (3)	
					Penetration Testing (3)	Penetration Testing (3)	
					Security Operation Center (2)	Security Operation Center (2)	
					Enterprise System Integration (3)	Enterprise System Integration (3)	
					Web Programming based on a framework (3)	Web Programming based on a framework (3)	
					IS Testing and Implementation (2)	IS Testing and Implementation (2)	
					Fieldwork I (14)	Fieldwork II (14)	
20 Credits	24 Credits	24 Credits	24 Credits	20 Credits	40/14** Credits	40/14** Credits	6 Credits

Legends

MKWU (General Compulsory Courses)	MKIP (Supporting Science and Technology Course)
MKIK/MKBS (Field of Study Course)	MKPP/MKPI (Study Programme Specific Courses)

* Courses offered to students outside the study program as interdiscipline courses.

** In semester 6 or 7 students can choose fieldwork or take elective concentration courses. The study program offers concentration elective courses of 40 credits which students can choose from a minimum of 14 credits. The fieldwork taken by students is recognized as a total of 14 credits.

Table 12. Course Description

No	Course Name	Description
1	Operating system	After following this course, students can explain operating system software, basic concepts in computer operating system components. Operating System discusses the introduction of computer systems, computer operating system structures, processes and threads, CPU scheduling, synchronization, deadlocks, memory management, storage media, protection systems, security, and networking. Activities in this course include practicum and synchronous and asynchronous discussions. The assessment used is Problem-solving, performance-based assessment.
2	Algorithms and Programming	After following this course, students can modify the basic algorithm according to simple computational problems. Algorithm and Programming discuss basic algorithm concepts, including sequential schemes, branching, looping, 1-dimensional arrays, formation types, functions, and procedures. Activities in this course include group discussions, case-based learning, project-based learning, and collaborative learning. The assessments used are independent assignments, group assignments, and product presentations.
3	Information System Concept	After following this course, students can apply the concept of management information systems and their uses to support the daily operations of an organization. The concept of Information Systems discusses the basic concepts of systems, basic management concepts, basic information concepts, information system concepts, computer-based Management Information Systems (MIS), public MIS, the role of MIS in decision making, decision-making methods in MIS, concepts, and roles of database systems. In MIS, communication and information technology in MIS. Activities in this course include tutorials and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). The assessments used are independent assignments, group assignments, and presentations of group assignments.
4	Business Process Analysis	After following this course, students can produce business process models and analysis documents utilizing qualitative and quantitative methods for organizational case studies. Business Process Analysis discusses business process concepts, identification, data/information collection techniques regarding business processes, business process modeling using Business Process Model and Notation (BPMN), business process analysis methods, and business process simulation at the same time. Activities in this course include group discussions, project-based learning, and collaborative learning. The assessments used are observation, formative and summative written tests, presentations, and products from projects that have been done.

5	Informatics Logic	After this course, students can describe various mathematical logic models and their applications using a computational algorithm approach. Informatics Logic discusses the basics of logic, equivalence, logical inversion, quantitative logic, number systems, boolean algebra, logic gates, canonicals, and Karnaugh maps. Activities in this course include group discussions, case-based learning, and collaborative learning. The assessments used are independent assignments, group assignments, and presentations.
6	Computer network	After taking this course, students will provide the necessary network structure for organizations and information system needs. Computer Networking discusses network protocols and their hierarchical relationships in the context of conceptual models, such as the OSI and TCP/IP frameworks; articulate low-level data communications and subsequent abstractions that enable hosts and network applications to communicate across the internet and build multiple host and network architectures, with business requirements and constraints; students will configure operating systems, network-specific services, routing, switching, and remote access solutions. Activities in this course include synchronous and asynchronous practicum and discussions. The assessment used is Problem-solving, performance-based assessment.
7	Programming and Data Structure	After following this course, students can modify various data structure models into computer programs according to the computational problems. Programming and Data Structures discusses searching with and without Boolean, 2-dimensional and N-dimensional arrays, pointers, stacks, queues, and sorting. Activities in this course include group discussions, case-based learning, project-based learning, and collaborative learning. The assessments used are independent assignments, group assignments, and product presentations.
8	Software engineering	After following this course, students can document software requirements based on their specifications. Software Engineering discusses the software life cycle, software requirements analysis, functional and non-functional software requirements, documentation standards and parts of SKPL documents, object-oriented system modeling with UML in the form of use case diagrams, activity diagrams, sequence diagrams and class diagrams, software interfaces, software testing, and software maintenance. Activities in this course include tutorials and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). Apart from studying individually, students are also directed to work together in a group. The assessments used are independent assignments, group assignments, and product presentations.
9	Database Design	After taking this course, students will design and develop relational databases. Database Design discusses Database Concepts, Entity Relational Diagrams, Database Normalization, Structured Query Languages, Database Projects. Activities in this course include tutorials, practicum, and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). The assessments used are Independent Tasks, Group Assignments, Written Tests, Project Presentations.

10	Software Analysis and Design	After taking this course, students can analyze software components related to the system and its information. Software Analysis and Design discusses systems, information and information systems, systems analysis, problem definition, information needs analysis, information system development, business process analysis, structured software modeling (DFD, data dictionary and data structures, conceptual data model). Physical data model), system design, and information architecture. Activities in this course include tutorials and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). Apart from studying individually, students are also directed to work together in a group. The assessments used are independent assignments, group assignments, and product presentations.
11	Enterprise Information System	After taking this course, students can describe the basic theory of organization, the basic concepts of information systems in the enterprise, recognize processes and activities based on Supply Chain Management, Enterprise Resource Planning, and Customer Relationship Management. Enterprise Information Systems discusses the basic concepts of Enterprise Information Systems, enterprise databases, Supply Chain Management, Enterprise Resource Planning, Customer Relationship Management, Analysis and Design of Enterprise Information Systems. Activities in this course include tutorials and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). Apart from studying individually, students are also directed to work together in a group. The assessments used are independent assignments, group assignments, and product presentations.
12	Information System Security	After following this course, students can explain security issues in building an information system. Information System Security discusses Introduction to Information Security, Methods for Attacks, Cryptography, Access Control, Authentication, Network Security, Operating System Security, Intrusion Detection System, Government Regulations About Data Security. Activities in this course include tutorials and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). Apart from studying individually, students are also directed to work together in a group. The assessments used are independent assignments, group assignments, and product presentations.
13	Object-Oriented Programming	After following this course, students can explain the object-oriented programming paradigm and implement object-oriented programming concepts in the Java programming language. Object-Oriented Programming discusses object-oriented programming paradigms, object-oriented concepts with ALICE, object-oriented programming with Greenfoot, Java Fundamentals. Activities in this course include tutorials, practicum, and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). The assessments used are independent assignments, group assignments, and product presentations.

14	Web-Based Programming	After taking this course, students will apply various web-based programming techniques with HTML, CSS, and PHP to build a static website or a dynamic website. Web-Based Programming discusses web-based programming, web-based programming using HTML and CSS, and dynamic web programming using the PHP programming language. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning LMS media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, presentations of tasks done in groups, presentations, and products of projects that had been done.
15	IS/IT Project Management	After following this course, students can plan and manage projects in the IS/IT field by properly implementing project management knowledge areas following the existing processes in management process groups. IS/IT Project Management discusses project management concepts within the scope of IS/IT, project knowledge areas, and project management process groups consisting of the initiation process, planning process, implementation process, control process, and project closing process. Activities in this course include group discussions and project-based learning with synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are participation tests, formative tests, group assignments, and presentations of group projects being worked on.
16	Database Management	After following this course, students can implement Query Language, Implement Advanced Query Language, Explain Distributed and Parallel Databases, Explain Data Mining, Describe Database Trends, and Implement Non-Relational Databases. Database Management discusses The design methodology for databases and verifying their structural correctness (Database Development Life Cycle), Implementing databases and applications software primarily in the relational model, Implementing Query Language (Data Definition, Manipulation, & Control Language) - MySQL, Advance SQL (Procedure, Function, View, Triggers, Indexes), Implementing Database Administration including security and integrity policies relating to databases, The basic principles behind data warehousing and preparation for data analytics, Basic knowledge about Non-Relational Databases, Working in group settings to design and implementing database projects. Activities in this course include synchronous learning (face to face online), reading material modules, practicing query language, presenting material, and doing projects in teams. The assessments used are independent assignments, group assignments, quizzes, written tests, project presentations.
17	Statistics	After following this course, students can apply the concepts of descriptive and inferential statistics for data analysis manually or with the help of statistical applications. Statistics discusses terms in statistics, data types/types, data presentation, data size, and value conversion, while topics for inferential statistics include probability, probability distribution, frequency distribution, sampling technique, and types of tests. Activities in this course include group discussions, case-based

		learning, and collaborative learning. The assessments used are independent assignments, group assignments, and presentations.
18	IT Service Management	After taking this course, students can produce IT service documents based on the ITIL framework that is in line with the organization's strategy to improve the performance of the organization's IT services. IT Service Management discusses the differences between IT governance and IT management, basic concepts of IT service management, IT service life cycle, main structure and function, service strategy, service design, service transition, service operation, and continual service improvement. Activities in this course include group discussions, project-based learning, and collaborative learning. The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
19	User Experience Design	After following this course, students can apply user experience and usability principles to the prototype design of a system according to user needs. User Experience Design discusses the basic concepts of human and computer interaction, usability paradigms and principles, User-Centered Design (UCD) concepts, User Experience (UX), User Interface (UI), user needs analysis, personas, task analysis, prototyping, and techniques evaluation. Activities in this course include tutorials and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). Apart from studying individually, students are also directed to work together in a group. The assessments used are independent assignments, group assignments, and product presentations.
20	E-Business	After taking this course, students can explain business concepts, design, and implementation electronically. E-Business discusses knowledge about eBusiness design, in general, to overcome business problems and analyze developments in business. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are independent assignments, group assignments, and product presentations.
21	Mobile Programming	After taking this course, students can produce applications on mobile devices. Mobile Programming discusses configuring Software Development Tools (SDK) as an Android-based application development tool, applying the concept of creating and using classes and objects, applying Android Run-time settings and Application Programming Interface (API), able to perform debugging and analysis processes. Bugs, able to implement Android application interface creation, implement a database for Android application, implement multimedia data into Android application, implement cloud-based database into Android application, and implement the process of publishing Android application. Activities in this course include practicum and synchronous and asynchronous discussions. The assessment used is Problem-solving, performance-based assessment.

22	Business Intelligence	After taking this course, students can design data visualizations with business intelligence tools that can help managers make business decisions using various sources of information and apply their experience to develop business accuracy dynamically. Business Intelligence discusses the basic concepts of business intelligence, the main aspects of business intelligence, business intelligence framework architecture, stages of business intelligence development, business intelligence tools, risks in business intelligence, and advanced analytics. Activities in this course include group discussions and project-based learning with synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are participation tests, formative tests, independent assignments, group assignments, and presentations of group projects being worked on.
23	IS/IT Investment Management	After taking this course, students can evaluate the benefits of IT investment, allocation of IT project costs and Strategies for Assessing the IT Benefits of an organization. IS/IT Investment Management discusses formulas such as Cost-Benefit Calculation, Investment Benefit Calculation, Investment Cost and Benefits Calculation, Measuring Intangible Benefits in IT Investments, and Strategies for Assessing the Benefits of Information Technology. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
24	IS/IT Architecture	After taking this course, students can produce IS/IT enterprise architecture documents based on the TOGAF framework that aligns with the organization's vision. IS/IT architecture discusses the IS/IT enterprise architecture framework with the Open Group Architecture Framework (TOGAF) framework approach starting from the concept of enterprise architecture, architectural methods and frameworks, enterprise modeling, architectural analysis and alignment, and TOGAF Architecture Development Method (ADM). . Activities in this course include group discussions, project-based learning, and collaborative learning. The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
25	IS/IT Governance	After taking this course, students can evaluate Information technology governance with IT governance models in organizations and align business processes and information technology. IS/IT Governance discusses the concepts, structures, processes of IT governance in organizations and various IT governance evaluation techniques such as COBIT 4.1, COBIT 5, and COBIT 2019. Activities in this course include synchronous learning (in the classroom/lab /teleconference) and asynchronous learning (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.

26	Business Ethics and the IS Profession	After taking this course, students can demonstrate ethical values for IS/IT professionals and businesses. Business Ethics and the IS Profession discusses the concept of ethics, various professionals and certifications in the IS/IT field, professional organizations and the ethics that accompany them, laws and crimes and violations of the law, especially those related to IT, Intellectual property rights and business ethics in the ICT field. Activities in this course include group discussions, case-based learning, and collaborative learning. The assessments used are observation, formative and summative written tests, oral tests through question and answer, and presentations of assignments done in groups related to cases regarding implementation. Professional and business ethics in IT.
27	Leadership and Interpersonal Skills	After taking this course, students can apply the concepts of leadership, communication, and self-management in their daily life. Leadership and Interpersonal Skills discusses soft understanding skills, the art of listening, persuading and giving feedback, conflict resolution, effective communication and negotiation, emotional intelligence, presentation techniques, and self and time management. Activities in this course include tutorials and discussions synchronously (in-class/teleconference) and asynchronously (through e-learning media). Apart from studying individually, students are also directed to work together in a group. The assessments used are independent assignments, group assignments, and presentations on several topics to hone communication skills.
28	Green Information System	After taking this course, students can produce roadmap documents for the transformation of environmentally friendly information systems in certain organizations. Green Information System discusses the concept of green IT, green IT strategy, business responsibilities related to the environment, environmentally friendly IT assets, environmentally friendly business process management, green information system design and modeling and organizational transformation roadmap. Activities in this course include group discussions, project-based learning, collaborative learning. The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
29	Computers and society*	After following this course, students can design the use of computers in various fields of community life and explain the impact of the application of information technology on the wider community. Computers and society* discuss computer systems and society, the history and development of computers, the use of computers in society and various fields, the definition of the information society, the characteristics of society with modern information technology, the business world with information technology, E-Business, E-Commerce, security information systems, cybercrime and professional ethics in the field of information technology. Activities in this course include group discussions and case-based learning with synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are participation tests, formative tests, independent assignments, group assignments, and presentations of group assignments.

30	E-Commerce*	After taking this course, students can master the concept and implementation of electronic sales for both individual and organizational needs. E-Commerce* discusses the concept and scope of E-Commerce (virtual business), E-Commerce transaction systems, recognizes security and ethical systems in E-Commerce, how to shop online, sells products via E-Commerce, types of and electronic payment systems, tools used to build E-Commerce sites. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are participation tests, formative tests, group assignments, and presentations of group assignments.
31	Technopreneurship*	After taking this course, students can create a business model canvas, business plan proposal, and minimum viable product (MVP) for a digital startup. Technopreneurship* discusses the stages in making a startup such as Blue Ocean Strategy, Business Model Canvas, Business Model Strategy, Lean Startup, Team Building & Market Analysis, Elevator Pitch. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
32	IS Research Methods	After following this course, students can explain various types of research, develop research proposals, techniques, and presentation exercises. The IS Research Method discusses Research Methodology, Science Concepts, Research Nature, Research Stages, Research Proposal Elements, Research Methods and Designs, Variables, Data on Research. Activities in this course include synchronous learning (in the classroom/lab/ teleconference), asynchronous learning (through e-learning media), and case-based learning. The assessments used are participation tests, formative tests, independent assignments, and presentations of the final assignments for the courses given.
33	Enterprise Resource Planning	After taking this course, students can analyze ERP components, ERP Manufacturing Process, and ERP Evaluation. Enterprise Resource Planning discusses the history of ERP, the benefits of system integration, ERP modules, ERP system creation, and development processes, and ERP evaluation. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
34	Information System Audit	After following this course, students can analyze the maturity of an organization's information technology implementation. Information System Audit discusses the concept and process of auditing information systems in organizations and various information systems audit evaluation techniques such as COSO, CMM, and COBIT 2019. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (in the classroom/lab/teleconference), and asynchronous learning (through e-learning media). The assessments used were observation, formative

		and summative written tests, oral tests through questions and answers, and project presentations.
35	IS/IT Quality Management	After taking this course, students can analyze the quality of information systems, user behavior, and supporting factors for the quality of information systems. IS/IT Quality Management discusses the basic concepts of IS/IT quality, IT quality standards, IS quality dimensions, Total Quality Management, and Benchmarking. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
36	IT Risk Management	After taking this course, students can evaluate the risks faced in using information technology and how to manage these risks so that the impact of risks can be reduced. IT Risk Management discusses the concept of risk management, information system security, applicable standards in information security risk management, methods of information security risk management, business continuity plans, and disaster recovery centers. Activities in this course include group discussions and case-based learning with synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are participation tests, formative tests, independent assignments, group assignments, and presentations of the final assignments for the courses.
37	E-Government	After following this course, students can demonstrate the phases of e-government development in building an e-government master plan. E-Government discusses e-government concepts such as Scope, Benefits, Principles of E-government, smart cities and smart villages, e-government development phases, implementation of e-government to prepare an e-government master plan. Activities in this course include tutorials and discussions synchronously (in the classroom/lab/teleconference) and asynchronously (through e-learning media) and project-based learning. The assessments used are independent assignments, group assignments, and product presentations.
38	IS/IT Strategic Planning	After following this course, students can produce IS/IT strategic planning documents according to the organization's needs. IS/IT Strategic Planning discusses the concept of strategic management within the scope of information systems, methodologies/frameworks, and processes in preparing strategic planning of information systems of an organization/business. Activities in this course include group discussions, project-based learning, collaborative learning. The assessments used were observation, formative and summative written tests, oral tests through questions and answers, and project presentations.
39	Decision Support System	After taking this course, students can apply the concept of expert systems and decision-making support systems into models of decision-making support systems with various frameworks. Decision Support System discusses the basic concepts of expert systems and decision support systems, certainty theory, probability, Fuzzy Multiple Attribute Decision Making (FMADM) methods, knowledge acquisition, machines, and

		inference methods. Activities in this course include group discussions, case-based learning, project-based learning, and collaborative learning. The assessments used are independent assignments, group assignments, and product presentations.
40	Data Mining	After taking this course, students can apply various data mining techniques to generate new knowledge from data to solve a problem. Data Mining discusses the basic concepts of data mining, data processing techniques, prediction techniques, and data descriptions so that certain patterns are obtained that can be useful information/knowledge to solve problems in everyday life. Activities in this course include tutorials, practicum, and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, presentations of tasks done in groups, presentations, and products of projects that had been done.
41	Data Warehouse	After taking this course, students will design and implement a data warehouse to support Online Analytical Processing (OLAP). Data Warehouse discusses the basic concepts of a data warehouse, database design in a data warehouse using a star schema or snowflake schema, Extraction Transformation & loading data into the data warehouse, Data transformation service (DTS), cubes, OLAP components such as pivot tables or dynamic cubes and techniques build data warehouse applications. Activities in this course include tutorials, practicum, and discussions synchronously (in-class/lab/teleconference) and asynchronously (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers, presentations of tasks done in groups, presentations, and products of projects that had been done.
42	Ethical Hacking	After following this course, students can describe the value of a good attitude in hacking (ethical hacking) and conclude problems in information systems. Ethical hacking discusses the hacking process (Reconnaissance, Scanning, Gaining Access, Maintaining Access, Clearing Tracks), console programming (bash and python), and analyzing required solutions. Activities in this course include practicum and synchronous and asynchronous discussions. The assessment used is Problem-solving, performance-based assessment.
43	Penetration Testing	After following this course, students can compare various tools in the analysis process and search for IS/IT infrastructure vulnerabilities. Penetration Testing discusses how to find out the vulnerabilities of the IS/IT infrastructure. Activities in this course include practicum and synchronous and asynchronous discussions. The assessment used is Problem-solving, performance-based assessment.

44	Security Operation Center	After taking this course, students can explain and demonstrate network security management at the enterprise level with Firewalls and IDS/IPS, besides analyzing evidence of a crime known as Digital Forensics. Security Operation Center discusses Firewall, Intrusion Detection/Prevention System, Digital Forensics Background, Computer Forensics Process, Harddisk and File System, Data Acquisition and Duplication Process, Anti-Forensic, Digital Forensics. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media), with case-based and project-based learning. The assessments used are participation tests, formative tests, group assignments, and presentations of group projects being worked on.
45	Enterprise System Integration	After taking this course, students can design a single system by applying the concept of integrating enterprise resources with the support of a reliable relational database system. Enterprise System Integration discusses the concepts of modern enterprise solutions, enterprise integration, extended enterprise integration in the supply chain, enterprise solution architecture, and ERP software packages. Activities in this course include group discussions and project-based learning with synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are participation tests, formative tests, independent assignments, group assignments, and presentations of group projects being worked on.
46	Framework-Based Web Programming	After taking this course, students will apply various framework-based web-based programming techniques to build a static website or a dynamic website. Framework-Based Web Programming discusses the basic concepts of web programming by using a framework to build a website. This course discusses three main things: 1) the basic concepts of framework-based web programming, 2) the concept of web programming with Laravel, and 3) Dynamic Web Programming with Laravel. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used are observation, formative and summative written tests, oral tests through questions and answers, presentations of tasks done in groups, and presentations of products from projects that have been done.
47	IS Testing and Implementation	After following this course, students will be able to apply various techniques and stages of testing and implementing an information system that suits the needs of system users. Testing and Implementation of IS discusses the basic concepts of software testing, testing techniques such as black box and white box, testing strategies, testing tools, and templates, managing the organization in testing, and implementing software implementation strategies. Activities in this course include synchronous learning (in the classroom/lab/teleconference) and asynchronous learning (through e-learning media). The assessments used were observation, formative and summative written tests, oral tests through questions and answers and presentations of tasks that were done in groups, presentations of case studies that had been done.