	Universitas Negeri Surabaya Faculty of Mathematics and Natural Sciences Data Science Undergraduate Study Program	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Data Security and Integrity	4920202029	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	3	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Hasanuddin Al-Habib , Ibnu Febry Kurniawan	.....	Yuliani Puji Astuti, S.Si., M.Si.

Learning model: Case Studies

Program Learning Outcomes (PLO)

PLO study program that is charged to the course

PLO-9	Able to apply data science principles to solve problems

Program Objectives (PO)

PO - 1	Able to explain the concept of data privacy correctly
PO - 2	Able to work together in the implementation of security and data privacy technologies that are useful in real life
PO - 3	Able to explain encryption mechanisms in general
PO - 4	Able to demonstrate ethical data use practices

PLO-PO Matrix

P.O	PLO-9
PO-1	
PO-2	
PO-3	
PO-4	

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PO-1																
PO-2																
PO-3																
PO-4																

Short Course Description: This course teaches the concepts and principles of data security and privacy relevant to the context of data scientists and is in accordance with the scope of the Data Privacy, Security, Integrity, and Analysis for Security (DPSIA) area in the ACM Curricula. The subject matter of this course includes security system concepts, classical encryption techniques, basic cryptography, mutual trust models, as well as current topics related to ethics and data privacy for artificial intelligence.

References

Main :

1. Stallings, William. 2011. Cryptography and Network Security System. United States: Prentice-Hall.

Supporters:

1. Weidman, Georgia. 2014. Penestration Testing: A Hands-on Introduction to Hacking. San Fransisco: No-Starch Press.
2. Chalse, R., Selokar, A., & Katara, A. (2013, September). A new technique of data integrity for analysis of the cloud computing security. In 2013 5th International Conference and Computational Intelligence and Communication Networks (pp. 469-473). IEEE.
3. Kumar, R., & Bhatia, M. P. S. (2020, October). A systematic review of the security in cloud computing: data integrity, confidentiality and availability. In 2020 IEEE International Conference on Computing, Power and Communication Technologies (GUCON) (pp. 334-337). IEEE.
4. Sivathanu, G., Wright, C. P., & Zadok, E. (2005, November). Ensuring data integrity in storage: Techniques and applications. In Proceedings of the 2005 ACM workshop on Storage security and survivability (pp. 26-36).
5. Lin, J., Yu, W., Zhang, N., Yang, X., & Ge, L. (2018). Data integrity attacks against dynamic route guidance in transportation-based cyber-physical systems: Modeling, analysis, and defense. IEEE Transactions on Vehicular Technology, 67(9), 8738-8753.
6. Pandey, A. K., Khan, A. I., Abushark, Y. B., Alam, M. M., Agrawal, A., Kumar, R., & Khan, R. A. (2020). Key issues in healthcare data integrity: Analysis and recommendations. IEEE Access, 8, 40612-40628.
7. Rajasekaran, A. S., Azees, M., & Al-Turjman, F. (2022). A comprehensive survey on blockchain technology. Sustainable Energy Technologies and Assessments, 52, 102039.
8. Yaga, D., Mell, P., Roby, N., & Scarfone, K. (2019). Blockchain technology overview. arXiv preprint arXiv:1906.11078.

Supporting lecturer	Agus Prihanto, S.T., M.Kom. Hasanuddin Al-Habib, M.Si.

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (*offline*)	Online (*online*)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Able to explain the concept of data privacy correctly	1.Explain the concept of sensitive data. 2.Explains the concept of a tradeoff between true privacy and the need for transparency in the dissemination of information. 3.Explains the basic concepts of computer security, data security, and information security	**Form of Assessment** : Participatory Activities	Face to Face Lecture Lecture Discussion 3 X 50		**Material:** Computer security concept, OSI architecture, Security Attacks, Security Services, Security Mechanism **Reader:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%
2	Able to explain the concept of data privacy correctly	1.Explain the implementation of computer security, data security, and information security 2.Details threats and system protection design	**Form of Assessment** : Participatory Activities	Face to Face Lecture Lecture Discussion 3 X 50		**Material:** Computer security concept, OSI architecture, Security Attacks, Security Services, Security Mechanism **Reader:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%
3	1.Able to explain the concept of data privacy correctly 2.Able to work together in the implementation of security and data privacy technologies that are useful in real life	1.Able to explain the basic concepts of cryptography in data security 2.Be able to explain public key systems 3.Able to explain the RSA working system	**Form of Assessment** : Participatory Activities	Face to Face Lecture Lecture Discussion 3 X 50		**Material:** Classical Encryption Techniques **Reference:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%

4	1. Able to explain the concept of data privacy correctly 2. Able to work together in the implementation of security and data privacy technologies that are useful in real life	1. Able to explain the basic concepts of cryptography in data security 2. Be able to explain public key systems 3. Able to explain the RSA working system	**Form of Assessment** : Participatory Activities	Face to Face Lecture Lecture Discussion 3 X 50		**Material:** Classical Encryption Techniques **Reference:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%
5	1. Able to explain the concept of data privacy correctly 2. Able to work together in the implementation of security and data privacy technologies that are useful in real life	1. Mention the concept of digital signature 2. Explain how the mutual trust model works 3. Explain the principles of user authentication protocols	**Form of Assessment** : Participatory Activities	Face to Face Lecture Lecture Discussion 3 X 50		**Material:** Classical Encryption Techniques **Reference:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%
6	Able to explain encryption mechanisms in general	1. Explain the principle of Block Cipher 2. Explain the basic concepts of Data Encryption Standard (DES) 3. Explains an example of DES	**Form of Assessment** : Participatory Activities, Portfolio Assessment	Face to Face Lecture Lecture Discussion 3 X 50	asynconous LMS	**Material:** Block Ciphers and the Data Encryption Standard **Reference:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%
7	Able to explain encryption mechanisms in general	1. Explain the principle of Block Cipher 2. Explain the basic concepts of Data Encryption Standard (DES) 3. Explains an example of DES	**Form of Assessment** : Participatory Activities, Portfolio Assessment	Face to Face Lecture Lecture Discussion 3 X 50	asynconous LMS	**Material:** Block Ciphers and the Data Encryption Standard **Reference:** *Stallings, William. 2011. Cryptography and Network Security Systems. United States: Prentice-Hall.*	2%
8	1. Able to explain the concept of data privacy correctly 2. Able to work together in the implementation of security and data privacy technologies that are useful in real life 3. Able to explain encryption mechanisms in general		**Form of Assessment** : Test	Midterm exam			20%

9	Able to explain encryption mechanisms in general	Explains the basic concepts of blockchain	**Form of Assessment** : Participatory Activities	Face to Face Lecture Lecture Discussion 3 X 50		**Material:** Blockchain technology **References:** *Rajasekaran, AS, Azees, M., & Al-Turjman, F. (2022). A comprehensive survey on blockchain technology. Sustainable Energy Technologies and Assessments, 52, 102039.* **Material:** Blockchain technology **References:** *Yaga, D., Mell, P., Roby, N., & Scarfone, K. (2019). Blockchain technology overview. arXiv preprint arXiv:1906.11078.*	2%
10	Able to demonstrate ethical data use practices	1. Explain the concept of data security in the case of data storage 2. Execute data integrity applications on data storage	**Form of Assessment** : Participatory Activities	Group Discussion 3 X 50		**Material:** data storage integrity **References:** *Sivathanu, G., Wright, CP, & Zadok, E. (2005, November). Ensuring data integrity in storage: Techniques and applications. In Proceedings of the 2005 ACM workshop on Storage security and survivability (pp. 26-36).*	4%

11	Able to demonstrate ethical data use practices	Explain the concept of data security in cloud computing	**Form of Assessment** : Participatory Activities	Group Discussion 3 X 50		**Material:** security in cloud computing **References:** *Kumar, R., & Bhatia, MPS (2020, October). A systematic review of the security in cloud computing: data integrity, confidentiality and availability. In 2020 IEEE International Conference on Computing, Power and Communication Technologies (GUCON) (pp. 334-337). IEEE.* **Material:** data integrity in cloud computing **References:** *Chalse, R., Selokar, A., & Katara, A. (2013, September). A new technique of data integrity for analysis of the cloud computing security. In 2013 5th International Conference and Computational Intelligence and Communication Networks (pp. 469-473). IEEE.*	10%
12	Able to demonstrate ethical data use practices	Examining the paper Data Integrity Attacks against Dynamic Route Guidance in Transportation-based Cyber-Physical Systems: Modeling, Analysis, and Defense	**Form of Assessment** : Participatory Activities	Group Discussion 3 X 50		**Material:** Data integrity in Dynamic Route Guidance **References:** *Lin, J., Yu, W., Zhang, N., Yang, X., & Ge, L. (2018). Data integrity attacks against dynamic route guidance in transportation-based cyber-physical systems: Modeling, analysis, and defense. IEEE Transactions on Vehicular Technology, 67(9), 8738-8753.*	10%
13	Able to demonstrate ethical data use practices	Examining the paper Key Issues in Healthcare Data Integrity: Analysis and Recommendations	**Form of Assessment** : Participatory Activities	Group Discussion 3 X 50		**Material:** Data integrity in Dynamic Route Guidance **References:** *Lin, J., Yu, W., Zhang, N., Yang, X., & Ge, L. (2018). Data integrity attacks against dynamic route guidance in transportation-based cyber-physical systems: Modeling, analysis, and defense. IEEE Transactions on Vehicular Technology, 67(9), 8738-8753.*	10%

14	Able to demonstrate ethical data use practices	1. Able to explain the benefits of data management ethics well 2. Able to explain current topics related to data security and integrity	**Form of Assessment** : Participatory Activities, Portfolio Assessment	Discussion of the topic of 3 X 50 paper review	asynchronous LMS		0%
15	Able to demonstrate ethical data use practices	1. Able to explain the benefits of data management ethics well 2. Able to explain current topics related to data security and integrity	**Form of Assessment** : Participatory Activities, Portfolio Assessment		asynchronous LMS		0%
16	Able to demonstrate ethical data use practices	1. Able to explain the benefits of data management ethics well 2. Able to explain current topics related to ethics and data privacy	**Form of Assessment** : Project Results Assessment / Product Assessment, Portfolio Assessment	Presentation 2 X 50	Create a data security and integrity review paper on data security problems in Indonesia		30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	48%
2.	Project Results Assessment / Product Assessment	15%
3.	Portfolio Assessment	17%
4.	Test	20%
		100%

Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.