	Universitas Negeri Surabaya Faculty of Engineering, Undergraduate Study Program in Informatics Engineering	Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Language and Automata Theory	5520202112	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	4	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Aditya Prapanca, S.T., M.Kom.

Learning model	Case Studies	
Program Learning Outcomes (PLO)	PLO study program that is charged to the course	
	Program Objectives (PO)	
	PO - 1	Ability to understand scientific concepts that support analysis, methods and distributed parallel computing techniques in the development of information technology software products for systems with computational complexity.
	PO - 2	Ability to identify, analyze, design and obtain solutions using computing
	PLO-PO Matrix	

P.O
PO-1
PO-2

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																

Short Course Description	This course examines the definition of grammar, Chomsky classification, Grammar and Regular Expressions, Finite State Automata, Context Free Grammar, Push Down Automata and Turing Machines
References	**Main :**

1. Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory , Languages, and Computation . Addison-Wesley.
2. James A. Anderson. 2006. Automata Theory with Modern Applications. Cambridge University Press.
3. Martin, C John. 2002. Introduction To Languanges & The Teory Of Computation, third Edition. New York: McGraw-Hill Science/Engineering/Math.

References	**Supporters:**
Supporting lecturer	Anita Qoiriah, S.Kom., M.Kom. Dr. Yuni Yamasari, S.Kom., M.Kom.

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	Students are able to: Explain the basic concepts of language theory and automata related to processing on computers Identify languages, strings, alphabets Identify operations on strings with examples Explain the difference between strings and languages Identify operations in languages with examples	- Able to explain the initial concepts of language and automata theory - Able to give examples of alphabets, strings and languages - Able to answer the results of string operations - Able to differentiate between strings and languages - Able to answer the results of language operations	**Form of Assessment** : Participatory Activities	Approach: Scientific Model: Cooperative Method: Lecture, problem-based learning, Discussion, Presentation 2 X 50		**Material:** concepts of language and automata theory. **References:** *Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley.*	2%
2	Students are able to understand types of language and analyze types of language	1. Students are able to explain the differences and special characteristics of the four grammars 2. Students are able to explain and give examples of each language belonging to each class of Chomskyian grammar 3. students are able to explain each higher level grammar as well as lower level grammar (for example, regular grammar is also context sensitive grammar)	**Criteria:** Student Participation, Student Presentation **Form of Assessment** : Participatory Activities	Lectures, Self-Learning, Group Discussions 2 X 50		**Material:** language type **Readers:** *Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley.*	5%
3	Students are able to understand Finite Automata (AH) from a language	1. Students are able to explain the definition of AHD as a pair of 5 tuples 2. Students are able to explain and present AHD in tabular form from known graph forms and vice versa 3. -Students are able to explain and carry out the AHD given to recognize a string and conclude that the string is not accepted by the AHD 4. Students are able to explain and draw conclusions regarding the equivalence of regular language with regular expressions. Perform operations on ER: concate, alternate and closure (Kleene and positive)	**Criteria:** Student Participation, Student Presentation **Form of Assessment** : Participatory Activities	Lectures, Problem Based Learning, Self-Learning, 2 X 50 Group Discussions		**Material:** Automata to Deterministics **References:** *Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley.* **Material:** Automata to Deterministics **References:** *Martin, C John. 2002. Introduction To Languages & The Theory Of Computation, third Edition. New York: McGraw-Hill Science/Engineering/Math.*	10%

4	Students are able to understand the types of Finite Automata and the concept of equivalence between these types	1.- Students are able to explain the concept of AHN, the difference between AHD and AHN 2.Students are able to explain AHN with graphs and tables 3.- Students are able to explain the AHN given to recognize the string w 4.- Students are able to explain the concept of AHN-epsilon, the difference between AHD, AHN and AHN-epsilon 5.- Students are able to explain and present AHN-epsilon in graphs and tables 6.- Students are able to explain and carry out the AHN-epsilon given to recognize the string w 7.- Students are able to form an AHN that is equivalent to a given AHN epsilon	**Criteria:** Student Participation, Student Presentation **Form of Assessment** : Participatory Activities	Lectures, Problem Based Learning, Self-Learning, 2X 50 Group Discussions		**Material:** Nondeterministic Finite Automata **References:** *Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley.* **Material:** Nondeterministic Automata **References:** *Martin, C John. 2002. Introduction To Languages & The Theory Of Computation, third Edition. New York: McGraw-Hill Science/Engineering/Math.* **Material:** Nondeterministic Finite Automata **Reference:** *James A. Anderson. 2006. Automata Theory with Modern Applications. Cambridge University Press.*	0%

5	Students are able to understand the types of Finite Automata and the concept of equivalence between these types	1.- Students are able to explain the concept of AHN, the difference between AHD and AHN 2.Students are able to explain AHN with graphs and tables 3.- Students are able to explain the AHN given to recognize the string w 4.- Students are able to explain the concept of AHN-epsilon, the difference between AHD, AHN and AHN-epsilon 5.- Students are able to explain and present AHN-epsilon in graphs and tables 6.- Students are able to explain and carry out the AHN-epsilon given to recognize the string w 7.- Students are able to form an AHN that is equivalent to a given AHN epsilon	**Criteria:** Student Participation, Student Presentation **Form of Assessment** : Participatory Activities	Lectures, Problem Based Learning, Self-Learning, 2X 50 Group Discussions		**Material:** Nondeterministic Finite Automata **References:** *Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley.* **Material:** Nondeterministic Automata **References:** *Martin, C John. 2002. Introduction To Languages & The Theory Of Computation, third Edition. New York: McGraw-Hill Science/Engineering/Math.* **Material:** Nondeterministic Finite Automata **Reference:** *James A. Anderson. 2006. Automata Theory with Modern Applications. Cambridge University Press.* **Material:** Nondeterministic Finite Automata **References:** *Hopcroft, Motwani, Ullman. 2001. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley.* **Material:** Nondeterministic Finite Automata **Reference:** *James A. Anderson. 2006. Automata Theory with Modern Applications. Cambridge University Press.*	10%
6	1. 2.Students are able to understand and design the AH of a language	Students are able to explain and make transformations of production sets in GR into AHN transition functions, transformations of transition functions in AHD into production sets in GR Form AHN-epsilon graphs if ER is known	**Criteria:** Student Participation, Student Presentation **Form of Assessment** : Participatory Activities	Lectures, Problem Based Learning, Self-Learning, 2 X 50 Group Discussions			10%
7	Able to describe the language of a particular grammar and describe the NFA transition graph from the NFA transition graph from a right - linear grammar and able to describe the grammar of an NFA transition graph	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 6 X 50			10%
8	Able to describe the language of a particular grammar and describe the NFA transition graph from the NFA transition graph from a right - linear grammar and able to describe the grammar of an NFA transition graph	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 6 X 50			10%

9	Able to prove that a language is not regular and use pumping lemma to prove that a language is not regular	1.Activeness in group discussions 2.- Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 3 X 50			10%
10	Able to prove that a language is not regular and use pumping lemma to prove that a language is not regular	1.Activeness in group discussions 2.- Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 3 X 50			10%
11	Able to understand the properties of equivalence relations in automata and able to understand the minimal automata algorithm in DFA	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 3 X 50			10%
12	Able to explain the language of CFG and Able to explain the concept of ambiguity	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 3 X 50			10%
13	Able to describe language from Chomsky Normal Form Able to convert language equivalent to Chomsky Normal Form	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discuss 3 X 50			10%
14	Able to explain whether a word was generated by CFG and able to use the CYK algorithm table to prove a word was generated by CFG	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Project Results Assessment / Product Assessment, Portfolio Assessment	Form: Lecture Method: Discussion 3 X 50			10%
15	Able to prove a language is not Context Free by using Pumping Lemma and Able to carry out concepts	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion 3 X 50			10%

16	Able to create automata models from Context Free language using PDA concepts and Able to implement stack concepts on PDA	1.Activeness in group discussions 2.Quality of summaries of individual study results	**Criteria:** 1.Activeness in group discussions 2.Quality of summaries of individual study results **Form of Assessment** : Portfolio Assessment	Form: Lecture Method: Discussion			10%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	37%
2.	Project Results Assessment / Product Assessment	5%
3.	Portfolio Assessment	95%
		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.