--

MODULE HANDBOOK

DATA STRUCTURE AND ALGORITHMS

BACHELOR DEGREE PROGRAM
DEPARTEMENT OF STATISTICS
FACULTY OF SCIENCE AND DATA ANALYTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER

ENDORSEMENT PAGE

	MODULE HANDBOOK **DATA STRUCTURE AND ALGORITHMS** **DEPARTMENT OF STATISTICS** **INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

Proses ***Process***	**Penanggung Jawab** ***Person in Charge***			**Tanggal** ***Date***
	Nama ***Name***	**Jabatan** ***Position***	**Tandatangan** ***Signature***	
Perumus *Preparation*	Dr. Kartika Fithriasari, M.Si	Dosen *Lecturer*		**March 28, 2019**
Pemeriksa dan Pengendalian *Review and Control*	Dr. Kartika Fithriasari, M.Si	Tim kurikulum *Curriculum team*		**April 15, 2019**
Persetujuan *Approval*	Prof. NUR Iriawan	Koordinator RMK *Course Cluster Coordinator*		**July 17, 2019**
Penetapan *Determination*	Dr. Kartika Fithriasari, M.Si	Kepala Departemen *Head of Department*		**July 30, 2019**

MODULE HANDBOOK

DATA STRUCTURE AND ALGORITHMS

Module name	**Data Structure and Algorithms**	
Module level	Undergraduate	
Code	KS184528	
Course (if applicable)	Data Structure and Algorithms	
Semester	Fifth Semester (Ganjil)	
Person responsible for the module	Dr. Kartika Fithriasari, M.Si	
Lecturer	Dr. Kartika Fithriasari, M.Si	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergradute degree program, **mandatory**, 5th semester.	
Type of teaching, contact hours	Lectures, <50 students	
Workload	1. Lectures : 2 x 50 = 100 minutes per week. 2. Practicum : 90 minutes per week. 3. Exercises and Assignments : 2 x 60 = 120 minutes (2 hours) perweek. 4. Private learning : 2 x 60 = 120 minutes (2 hours) per week	
Credit points	2 credit points (SKS)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	Pemrograman Komputer/ *Computer Programming*	
Learning outcomes and their corresponding PLOs	*CPMK.1 Able to explain and apply the concept of Data Structure for statistical analysis purposes* *CPMK.2 Able to explain Data Structure procedures* *CPMK.3 Able to apply Data Structure to analyze data and interpret it, such as doing data management, etc.* *CPMK.4 Able to identify, formulate, and solve statistical problems in the Data Structure field* *CPMK.5 Able to use computing techniques and modern computer devices required in the field of statistics* *CPMK.6 Have knowledge of current and future issues in order to be able to make the right decisions for the preparation of data structures based on existing problems and able to communicate the results of analysis both verbally and in writing* *CPMK.7 Able to communicate effectively and cooperate in interdisciplinary and multidisciplinary teams*	PLO – 1 PLO – 3 PLO – 4 PLO – 5

	CPMK.8 Has professional responsibilities and ethics *CPMK.9 Able to motivate yourself to think creatively and learn throughout life*	
Content	*The data structure course discusses the dynamic arrangement of data. The basic knowledge that students must have is programming knowledge. This course is useful for compiling simulation result data. Stack material provides an overview of data processing if the arrangement of data is stacked, pointer, queue and list material provides an overview of data processing sequentially. Material Tree, sort graph and search are useful for sorting data.*	
Study and examination requirements and forms of examination	• In-class exercises • Assignment 1, 2, 3 • Mid-term examination • Final examination	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	1. Goodrich, Tamassia and Goldwasser. 2013. Data Structures and Algorithms in Python. ISBN: 978-1-118-29027-9. 2. Lee, Kent D. and Hubbard, Steve. 2015. Data Structures and Algorithms with Python. ISSN 1863-7310 DOI 10.1007/978-3-319-13072-9. 3. Shaffer, Clifford A. 2012. Data Structures and Algorithm Analysis in C++. 3rd edition. ISBN: 048648582X and 9780486485829. 4. Weiss, M. A. and Wesley,Addison. 2007. Data Structures and Algorithm Analysis in C++. 3rd edition. ISBN-10: 032144146X dan ISBN-13: 9780321441461 .	

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

Bahan Kajian/*Study Materials*	Dasar Sains, Teori Statistika, Pengumpulan Data, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Pemodelan, Industri dan Bisnis, Pemerintahan dan Kependudukan, Ekonomi dan Manajemen, Kesehatan dan Lingkungan, Sosial Humaniora *Basic Science, Statistical Theory, Data Collection, Description and Exploration, Computational and Data Processing, Modeling, Industry and Business, Government and Population, Economics and Management, Health and Environment, Social Humanities*
CPL yang dibebankan MK/*PLO*	CPL-1 Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi CPL-3 Mampu menganalisis data dengan metode statistika yang tepat dan mengintepretasikannya CPL-4 Mampu mengindentifikasi,memformulasi, dan menyelesaikan masalah statistika di berbagai bidang terapan CPL-5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam bidang statistika dan sains data *CPL-1 Able to apply statistical, mathematical, and computational theory knowledge* *CPL-3 Able to analyze data with the right statistical methods and interpret it* *CPL-4 Able to identify, formulate, and solve statistical problems in various applied fields* *CPL-5Able to use the computing techniques and modern computer devices required in the field of statistics and data science*
CP-MK/*CLO*	CPMK.1 Mampu menjelaskan dan menerapkan konsep Struktur Data untuk keperluan analisis statistik CPMK.2 Mampu menjelaskan prosedur Struktur Data CPMK.3 Mampu mengaplikasikan Struktur Data untuk menganalisis data dan mengintepretasikannya, seperti melakukan manajemen data, dsb. CPMK.4 Mampu mengindentifikasi,memformulasi, dan menyelesaikan masalah statistika di bidang Struktur Data CPMK.5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam bidang statistika CPMK.6 Memiliki pengetahuan tentang isu terkini dan mendatang supaya mampu mengambil keputusan yang tepat untuk penyusunan struktur data berdasarkan permasalahan yang ada dan mampu mengkomunikasikan hasil analisis baik secara lisan maupun tertulis CPMK.7 Mampu berkomunikasi secara efektif dan bekerjasama dalam tim yang interdisiplin dan multidisiplin CPMK.8 Memiliki tanggung jawab dan etika profesi CPMK.9 Mampu memotivasi diri untuk berpikir kreatif dan belajar sepanjang hayat *CPMK. 1 Able to explain and apply the concept of Data Structure for statistical analysis purposes* *CPMK. 2 Able to explain data structure procedures* *CPMK. 3 Able to apply Data Structure to analyze data and interpret it, such as doing data management, etc.* *CPMK. 4 Able to identify, formulate, and solve statistical problems in the Data Structure field* *CPMK. 5 Able to use computing techniques and modern computer devices required in the field of statistics* *CPMK. 6 Have knowledge of current and future issues in order to be able to make the right decisions for the preparation of data structures based on existing problems and able to communicate the results of analysis both verbally and in writing* *CPMK. 7 Able to communicate effectively and cooperate in interdisciplinary and multidisciplinary teams*

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

	CPMK.8 Has professional responsibilities and ethics *CPMK.9 Able to motivate yourself to think creatively and learn throughout life*

Perte-muan *Meeting*	**Kemampuan Akhir Sub CP-MK** *Sub CLO Final Capability*	**Keluasan (materi pembelajaran)** *Extent (Learning Materials)*	**Metode Pembelajaran** *Learning methods*	**Estimasi Waktu** *Estimated Time*	**Bentuk Evaluasi** *Evaluation Form*	**Kriteria dan Indikator Penilaian** *Assessment Criteria and Indicator*	**Bobot Penilaian** *Scoring Weight*
	1. Memahami konsep Struktur Data untuk keperluan analisis statistic *1. Understanding the concept of Data Structure for statistic analysis purposes*	Dasar-dasar Struktur Data *Basics of Data Structure*	Ceramah interaktif Diskusi (CID) *Interactive lectures, Discussions (CID)*		Tes Observasi Aktifitas di kelas (TOA) *Test* *Observation Activities in the classroom (TOA)*	1.1 Dapat menjelaskan dan memahami struktur Data dalam system informasi 1.2 Dapat mengidentifikasi metode struktur data yang sesuai dengan permasalahan *1.1 Can explain and understand the data structure in the information system* *1.2 Can identify data structure methods that correspond to the problem*	5%/5%
	2. Mampu menyusun program rekursif untuk kasus sederhana *2. Able to put together a recursive program for simple cases*	Record *Record*	CID, Latihan Soal (L) *CID, Exercise(L)*		TOA *TOA*	2.1 Dapat menjelaskan kegunaan RECORD dalam struktur Data dan system informasi 2.2 Dapat Membuat algoritma untuk membentuk suatu record 2.3 Dapat membuat program untuk mengelola suatu record	5%/10%

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

						2.1 Can explain the usefulness of RECORD in data structure and information system *2.2 Can Create algorithms to form a record* *2.3 Can create a program to manage a record*	
	3. Mampu melakukan manajemen data dengan metode LIST *3. Able to perform data management with LIST method*	LIST *LIST*	CIDLP *CIDLP*		TOA *TOA*	3.1 Dapat menjelaskan dan menggunakan metode LIST dengan tepat 3.2 Dapat menyusun algoritma dan program untuk mengelola data dengan metode LIST *3.1 Can explain and use the LIST method appropriately* *3.2 Can compile algorithms and programs to manage data with LIST method*	10%/20%
	4 Mampu melakukan pengurutan data dengan metode SORT *4. Able to sort data with SORT method*	SORT *SORT*	CIDLP *CIDLP*		TOA *TOA*	4.1 Dapat menggunakan metode TREE untuk menyusun data 4.2 Dapat menyusun algoritma dan program untuk mengelola data dengan metode SORT 4.3 Dapat menerapkan metode SORT pada permasalahan real	10%/30%

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

						4.1 Can use the TREE method to collate data *4.2 Can compile algorithms and programs to manage data with SORT method* *4.3 Can apply SORT method to real problems*	
	5 Mampu melakukan manajemen data dengan metode STACK *5. Able to perform data management with STACK method*	STACK *STACK*	CIDL Praktikum (P) *CIDLP*		TOA *TOA*	5.1. Dapat menjelaskan manfaat dari metode STACK dalam struktur Data dan system informasi 5.2 Dapat Membuat algoritma dan program STACK 5.3 Dapat mengelola data dengan menggunakan metode STACK *5.1. Can explain the benefits of STACK methods in data structures and information systems* *5.2 Can Create STACK algorithms and programs* *5.3 Can manage data by using stack method*	10%/40%
	6 Mampu melakukan manajemen data untuk system antrian *6. Able to do data management for queue system*	QUEUE *QUEUE*	CIDLP *CIDLP*		TOA Tugas 1 *TOA* *Assignment 1*	6.1. Dapat menjelaskan system antrian dan metode QUEUE 6.2. Dapat menyusun algoritma dan program QUEUE 6.3.Dapat menerapkan metode QUEUE pada permasalahan real	15%/55%

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

						6. 1. Can explain queue system and QUEUE method *6.2. Can compile QUEUE algorithms and programs* *6.3.Can apply QUEUE method to real problems*	
6	**ETS/***Midterm*						
	7 Mampu melakukan manajemen data dengan metode SETS *7. Able to perform data management with SETS method*	SETS *SETS*	CIDLP *CIDLP*		TOA *TOA*	7.1 Dapat menjelaskan dan menggunakan metode SETS untuk menyusun data 7.2 Dapat menyusun algoritma dan program untuk mengelola data dengan metode SETS 7.3 Dapat menerapkan metode SETS pada permasalahan real *7.1 Can describe and use the SETS method to compile data* *7.2 Can compile algorithms and programs to manage data with sets method* *7.3 Can apply SETS method to real problems*	15%/70%
	8 Mampu melakukan Penyusunan data dengan metode TREE	TREE *TREE*	CIDLP *CIDLP*		TOA *TOA*	8.1 Dapat menjelaskan dan menggunakan metode TREE untuk menyusun data	15%/85%

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

	8. Able to do data preparation with TREE method					8.2 Dapat menyusun algoritma dan program untuk mengelola data dengan metode TREE 8.3 Dapat menerapkan metode TREE pada permasalahan real *8.1 Can describe and use the TREE method to collate data* *8.2 Can compile algorithms and programs to manage data with tree method* *8.3 Can apply TREE method to real problems*	
	9 Mampu melakukan Dekomposisi data dengan metode GRAPH *9. Able to decompose data with GRAPH method*	GRAPH *GRAPH*	CIDLP *CIDLP*		TOA Tugas 2 *TOA* *Assignment 2*	9.1 Dapat menggunakan metode GRAPH untuk keperluan analisis data Statistik 9.2 Dapat menyusun algoritma dan program untuk mengelola data dengan metode GRAPH 9.3 Dapat menerapkan metode GRAPH pada permasalahan real *9.1 Can use GRAPH method for statistical data analysis purposes*	15%/100%

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Struktur Data dan Algoritma
	Kode Mata Kuliah	KS184528
	Semester/SKS	V/2
	MK Prasyarat	Pemrograman Komputer
RP-S1	Dosen Pengampu	Dr. Dra. Kartika Fithriasari, M.Si

						9.2 Can compile algorithms and programs to manage data with GRAPH method *9.3 Can apply GRAPH method to real problems*	
	EAS/*Finalterm*						

PUSTAKA/*References* **:**

1. Data Structures and Algorithms with Python, 2015, Kent D. Lee, Steve Hubbard, ISSN 1863-7310 DOI 10.1007/978-3-319-13072-9
2. Data Structures and Algorithms in Python, 2013, Goodrich, Tamassia, and Goldwasser. ISBN: 978-1-118-29027-9
3. Data Structures and Algorithm Analysis in C++, Third Edition, 2012, Clifford A. Shaffer, ISBN: 048648582X,9780486485829
4. Data Structures and Algorithm Analysis in C++ (3rd edition), 2007, M. A. Weiss. Addison-Wesley, ISBN-10: 032144146X & ISBN-13: 9780321441461