

MODULE HANDBOOK  
**EXPLORATIVE  
DATA ANALYSIS**



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

## ENDORSEMENT PAGE



# MODULE HANDBOOK EXPLORATIVE DATA ANALYSIS DEPARTMENT OF STATISTICS INSTITUT TEKNOLOGI SEPULUH NOPEMBER

<b>Proses Process</b>	<b>Penanggung Jawab Person in Charge</b>			<b>Tanggal Date</b>
	<b>Nama Name</b>	<b>Jabatan Position</b>	<b>Tandatangan Signature</b>	
Perumus <i>Preparation</i>	Dra. Wiwiek Setya Winahju, M.S.	Dosen <i>Lecturer</i>		<b>March 28, 2019</b>
Pemeriksa dan Pengendalian <i>Review and Control</i>	Dra. Wiwiek Setya Winahju, M.S. ; Adatul Mukarromah, S.Si. M.Si	Tim kurikulum <i>Curriculum team</i>		<b>April 15, 2019</b>
Persetujuan <i>Approval</i>	Prof. Nur Iriawan	Koordinator RMK <i>Course Cluster Coordinator</i>		<b>July 17, 2019</b>
Penetapan <i>Determination</i>	Dr. Kartika Fithriasari, M.Si	Kepala Departemen <i>Head of Department</i>		<b>July 30, 2019</b>

# MODULE HANDBOOK

## EXPLORATIVE DATA ANALYSIS

Module name	<b>Explorative Data Analysis</b>	
Module level	Undergraduate	
Code	KS18442	
Course (if applicable)	Explorative Data Analysis	
Semester	Fourth Semester (Genap)	
Person responsible for the module	Dra. Wiwiek Setya Winahju, M.S.	
Lecturer	Dra. Wiwiek Setya Winahju, M.S.	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, <b>mandatory</b> , 4 <sup>th</sup> semester.	
Type of teaching, contact hours	Lectures, <50 students	
Workload	<ol style="list-style-type: none"> <li>1. Lectures : 2 x 50 = 100 minutes per week.</li> <li>2. Practicum : 90 minutes per week.</li> <li>3. Exercises and Assignments : 2 x 60 = 120 minutes (2 hours) per week.</li> <li>4. Private learning : 2 x 60 = 120 minutes (2 hours) per week.</li> </ol>	
Credit points	2 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 75% of the lectures to sit in the exams.	
Mandatory prerequisites	Pengantar Metode Statistika / <i>Introduction to Statistical Methods</i>	
Learning outcomes and their corresponding PLOs	<p><i>CLO.1 Able to understand and explain the use of data exploration concepts in data analysis</i></p> <p><i>CLO.2 Able to explain the Data Exploration procedure</i></p> <p><i>CLO.3 Able to analyze data with appropriate statistical methods and interpret them in the field of Data Exploration Techniques in data analysis</i></p> <p><i>CLO.4 Able to identify, formulate, and solve statistical problems using data exploration techniques</i></p> <p><i>CLO.5 Able to use modern computing techniques and computer equipment required in the field of data exploration techniques</i></p> <p><i>CLO.6 Have knowledge of current and future issues related to the field of data exploration techniques</i></p>	<p>PLO-01</p> <p>PLO-03</p> <p>PLO-04</p>

	<p><i>CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams</i></p> <p><i>CLO.8 Have professional responsibilities and ethics</i></p> <p><i>CLO.9 Able to motivate oneself to think creatively and learn lifelong</i></p>	PLO-05
Content	<p><i>This course studies techniques to summarize or explore data before more complex data analysis is carried out, so that initial information is obtained about the data. The techniques studied in this course include: identifying data patterns through diagrams or graphs, determining patterns of relationships between variables using scatter diagrams, making equation lines and smoothing data, and comparing several groups of data and data distribution.</i></p>	
Study and examination requirements and forms of examination	<ul style="list-style-type: none"> <li>• In-class exercises</li> <li>• Assignment 1, 2, 3</li> <li>• Mid-term examination</li> <li>• Final examination</li> </ul>	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	<ol style="list-style-type: none"> <li>1. Roger D. P., 2015. Exploratory Data Analysis with R. Leanpub.</li> <li>2. Tukey, J.W., 1993. Exploratory Data Analysis, Past, Present and Future. Technical Report. Princeton University.</li> <li>3. Velleman, P.F., and Hoaglin, D.C., 2004. Application, Baasic, and Computing of Exploratory Data Analysis. Duxbury Press.</li> </ol>	

<b>Bahan Kajian</b> <i>Study Materials</i>	<p>Dasar Sains, Teori Statistika, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Pemodelan, Industri dan Bisnis, Pemerintahan dan Kependudukan, Ekonomi dan Manajemen, Kesehatan dan Lingkungan, Sosial Humaniora</p> <p><i>Basic Science, Statistical Theory, Description and Exploration, Computing and Data Processing, Modeling, Industry and Business Government and Population, Economics and Management, Health and Environment, Social Humanities</i></p>
<b>CPL yang dibebankan MK</b> <i>PLO</i>	<p>CPL-1 Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi  CPL-3 Mampu menganalisis data dengan metode statistika yang tepat dan menginterpretasikannya  CPL-4 Mampu mengidentifikasi, 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</p> <p><i>PLO-1 Able to apply knowledge of statistical theory, mathematics, and computation</i>  <i>PLO-3 Able to analyze data with appropriate statistical methods and interpret them</i>  <i>PLO-4 Able to identify, formulate, and solve statistical problems in various applied fields</i>  <i>PLO-5 Able to use computational techniques and modern computer equipment required in statistics and data science</i></p>
<b>CP-MK</b> <i>CLO</i>	<p>CPMK.1 Mampu memahami dan menjelaskan penggunaan konsep Eksplorasi Data dalam Analisis Data  CPMK.2 Mampu menjelaskan prosedur Eksplorasi Data  CPMK.3 Mampu menganalisis data dengan metode statistika yang tepat dan menginterpretasikannya di bidang Teknik Eksplorasi Data dalam Analisis data  CPMK.4 Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah statistika menggunakan teknik eksplorasi data  CPMK.5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam bidang teknik eksplorasi data  CPMK.6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang teknik eksplorasi data  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</p> <p><i>CLO.1 Able to understand and explain the use of data exploration concepts in data analysis</i>  <i>CLO.2 Able to explain the Data Exploration procedure</i>  <i>CLO.3 Able to analyze data with appropriate statistical methods and interpret them in the field of Data Exploration Techniques in data analysis</i>  <i>CLO.4 Able to identify, formulate, and solve statistical problems using data exploration techniques</i>  <i>CLO.5 Able to use modern computing techniques and computer equipment required in the field of data exploration techniques</i>  <i>CLO.6 Have knowledge of current and future issues related to the field of data exploration techniques</i>  <i>CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams</i>  <i>CLO.8 Have professional responsibilities and ethics</i>  <i>CLO.9 Able to motivate oneself to think creatively and learn throughout life</i></p>

Pertemuan Meeting	Kemampuan Akhir Sub CP-MK Final Ability	Keluasan (materi pembelajaran) Extent (learning material)	Metode Pembelajaran Learning methods	Estimasi Waktu Duration	Bentuk Evaluasi Evaluation Type	Kriteria dan Indikator Penilaian Assessment Criteria and Indicators	Bobot Penilaian Scoring
1	1. Dapat menjelaskan Teknik Eksplorasi Data <i>1. Can explain Data Exploration Techniques</i>	Pengantar teknik eksplorasi data <i>Introduction to data exploration techniques</i>	Ceramah interaktif Diskusi (CID) <i>Interactive lectures Discussion</i>	100 menit <i>100 minutes</i>	Observasi Aktifitas di kelas Tes 1 <i>Observation of classroom activities Test 1</i>	1. Dapat menjelaskan hubungan teknik Eksplorasi Data dengan Analisis Data 2. Dapat menjelaskan kegunaan Eksplorasi Data 3. Dapat menerapkan Teknik Eksplorasi Data sederhana <i>1) Can explain the relationship between data exploration techniques and data analysis 2) Can explain the usefulness of data exploration 3) Can apply simple data exploration techniques</i>	5%/5%
2-3	1. Dapat membuat grafik sederhana dari data menggunakan software MINITAB dan R  <i>1. Can make simple graphs from data using MINITAB and R software</i>	Boxplot, Histogram, Scatterplot <i>Boxplot, Histogram, Scatterplot</i>	CID, Praktikum, Latihan Soal (PL) <i>Interactive lectures Discussion, Practicum, Problem Exercise</i>	200 menit <i>200 minutes</i>	Observasi Aktifitas di kelas Tes 1 <i>Observation of classroom activities Test 1</i>	1. Dapat membuat Bentuk Boxplot untuk deteksi outlier 2. Dapat membuat perbandingan distribusi data dengan Boxplot dan Histogram 3. Dapat menjelaskan hubungan antara dua variabel menggunakan scatterplot <i>1. Can make a Boxplot Shape for outlier detection 2. Can make data distribution comparisons with Boxplot and Histogram 3. Can explain the relationship between two variables using a scatterplot</i>	15%/20%
4-5	2. Dapat memodifikasi grafik menggunakan software R	Histogram, Scatterplot <i>Histogram, Scatterplot</i>	CID, <i>Interactive lectures</i>	200 menit <i>200 minutes</i>	Observasi Aktifitas di kelas Tes 1 Tugas 1	1. Dapat memodifikasi histogram menggunakan software R 2. Dapat memodifikasi scatterplot menggunakan software R	15%/35%

Pertemuan Meeting	Kemampuan Akhir Sub CP-MK Final Ability	Keluasan (materi pembelajaran) Extent (learning material)	Metode Pembelajaran Learning methods	Estimasi Waktu Duration	Bentuk Evaluasi Evaluation Type	Kriteria dan Indikator Penilaian Assessment Criteria and Indicators	Bobot Penilaian Scoring
	2) <i>Can modify graphics using R software</i>		<i>Discussion, Practicum, Problem Exercise</i>		<i>Observation of classroom activities Test 1 Task 1</i>	<ol style="list-style-type: none"> <li><i>Can modify the histogram using R software</i></li> <li><i>Can modify the scatterplot using R software</i></li> </ol>	
6-7	3. Dapat membuat garis yang menyatakan hubungan dua variabel  3) <i>Can make a line that expresses the relationship of two variables</i>	Resistant Line <i>Resistant Line</i>	<i>CIDL Interactive lectures Discussion, Practicum, Problem Exercise</i>	200 menit <i>200 minutes</i>	Observasi Aktifitas di kelas Tes 1 <i>Observation of classroom activities Test 1</i>	<ol style="list-style-type: none"> <li>Dapat membuat garis resistant yang menyatakan hubungan dua variabel</li> <li>Dapat mengintegrasikan nilai statistik dari garis resistant</li> <li>Dapat melakukan uji kelayakan garis resistant</li> </ol> <ol style="list-style-type: none"> <li><i>Can make a line of resistance that shows the relationship between two variables</i></li> <li><i>Can integrate the statistical value of the resistant line</i></li> <li><i>Can perform a resistant line feasibility test</i></li> </ol>	15%/50%
8	<b>ETS</b>						
9-11	4. Dapat melakukan Smoothing Data  4) <i>Can do Data Smoothing</i>	Smoothing Data <i>Data Smoothing</i>	<i>CIDLS Interactive lectures Discussion, Problem Exercise</i>	300 menit <i>300 minutes</i>	Observasi Aktifitas di kelas Tugas 2 <i>Observation of classroom activities Task 2</i>	<ol style="list-style-type: none"> <li>Dapat menjelaskan smoothing data dan membuat ringkasan data</li> <li>Dapat menentukan elemen smoothing</li> <li>Dapat mendekomposisi data</li> <li>Dapat menentukan kedalaman informasi dari visualisasi data</li> </ol> <ol style="list-style-type: none"> <li><i>Can explain data smoothing and summarize data</i></li> <li><i>Can define smoothing elements</i></li> <li><i>Can decompose data</i></li> <li><i>Can determine the depth of information from data visualization</i></li> </ol>	20%/70%

Pertemuan <i>Meeting</i>	Kemampuan Akhir Sub CP-MK <i>Final Ability</i>	Keluasan (materi pembelajaran) <i>Extent (learning material)</i>	Metode Pembelajaran <i>Learning methods</i>	Estimasi Waktu <i>Duration</i>	Bentuk Evaluasi <i>Evaluation Type</i>	Kriteria dan Indikator Penilaian <i>Assessment Criteria and Indicators</i>	Bobot Penilaian <i>Scoring</i>
12-13	5. Dapat melakukan perbandingan beberapa kelompok data.  5) <i>Can perform comparisons of several groups of data.</i>	Median Polish <i>Median Polish</i>	CIDLS <i>Interactive lectures Discussion, Problem Exercise</i>	200 menit <i>200 minutes</i>	Observasi Aktifitas di kelas <i>Observation of classroom activities</i>	1. Dapat menentukaan perbedaan median polish dan ANOVA 2. Membuat ringkasan dari table dua arah 3. Dapat menentukan kelayakan model dari table dua arah  <i>1. Can determine the difference between median polish and ANOVA 2. Create a summary from a two-way table 3. Can determine the feasibility of the model from a two-way table</i>	15%/85%
14-15	6. Dapat melakukan perbandingan distribusi data  <i>6. Can perform data distribution comparisons</i>	Rootogram <i>Rootogram</i>	CIDLS <i>Interactive lectures Discussion, Problem Exercise</i>	200 menit <i>200 minutes</i>	Observasi Aktifitas di kelas <i>Observation of classroom activities</i>	1. Dapat membuat rootogram 2. Dapat melakukan uji residual 3. Dapat melakukan uji distribusi normal  <i>1. Can make a rootogram 2. Can perform a residual test 3. Can perform normal distribution test</i>	15%/100%
16	<b>EAS</b>						

**PUSTAKA /REFERENCES:**

1. Roger D. P., : Exploratory Data Analysis with R, Leanpub 2015
2. Velleman, P.F., Hoaglin, D.C., : Application, Baasic, and Computing of Exploratory Data Analysis , Duxbury Press 2004
3. Tukey, J.W., : Exploratory Data Analysis, Past, Present and Future, Technical Report, Princeton University, 1993