


MODULE HANDBOOK
**MATHEMATICS
STATISTICS II**



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

ENDORSEMENT PAGE

	<p>MODULE HANDBOOK MATHEMATICS STATISTICS II DEPARTMENT OF STATISTICS INSTITUT TEKNOLOGI SEPULUH NOPEMBER</p>
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Proses Process	Penanggung Jawab Person in Charge			Tanggal Date
	Nama Name	Jabatan Position	Tandatangan Signature	
<i>Perumus Preparation</i>	Dr. Drs. Purhadi, M.Sc	Dosen <i>Lecturer</i>		March 28, 2019
<i>Pemeriksa dan Pengendalian Review and Control</i>	Dra. Wiwiek Setya Winahju, M.S. ; Dra. Madu Ratna, M.Si ; Wibawati, S.Si, M.Si	Tim kurikulum <i>Curriculum team</i>		April 15, 2019
<i>Persetujuan Approval</i>	Dr. Santi Wulan Purnami, M.Si	Koordinator RMK <i>Course Cluster Coordinator</i>		July 17, 2019
<i>Penetapan Determination</i>	Dr. Kartika Fithriasari, M.Si	Kepala Departemen <i>Head of Department</i>		July 30, 2019

MODULE HANDBOOK

MATHEMATICS STATISTICS II

Module name	MATHEMATICS STATISTICS II	
Module level	Undergraduate	
Code	KS184513	
Course (if applicable)	MATHEMATICS STATISTICS II	
Semester	Third Semester (Ganjil)	
Person responsible for the module	Dr. Drs. Purhadi, M.Sc	
Lecturer	Dra. Wiwiek Setya Winahju, M.S. ; Dra. Madu Ratna, M.Si ; Wibawati, S.Si, M.Si	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, mandatory , 5 th semester.	
Type of teaching, contact hours	Lectures, <50 students	
Workload	<ol style="list-style-type: none"> 1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 3 x 60 = 180 minutes (3 hours) per week. 3. Private learning : 3 x 60 = 180 minutes (3 hours) per week. 	
Credit points	3 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	Statistika Matematika I/ Mathematical Statistics I	
Learning outcomes and their corresponding PLOs	<p><i>CLO. 1 Master the concepts of sampling distribution, assessment, estimator determination methods, estimator properties, loss and risk functions, statistical adequacy, exponential family, unfamiliarity, equivariance, uniformly most powerful test, unfamiliarity for hypothesis testing, linear hypothesis</i></p> <p><i>CLO. 2 Can formulate problems of distribution of sampling, estimation, method of determining estimators, the properties of the estimators, the loss and risk functions, the adequacy statistics. Exponential family, unfamiliarity, equivariance, uniformly most powerful test, unfamiliarity for hypothesis testing, linear hypothesis.</i></p> <p><i>CLO. 3 Can complete sampling distribution, estimation, estimation method, estimator properties, loss and risk function, adequacy statistic, exponential family,</i></p>	PLO-01

	<p><i>unfamiliarity, equivariance, uniformly most powerful test, unfamiliarity for hypothesis testing, linear hypothesis</i></p> <p><i>CLO. 4 Can choose the method of determining the distribution of sampling, estimation, test statistics.</i></p> <p><i>CLO. 5 Can adapt to the problem of estimating and testing the hypothesis.</i></p> <p><i>CLO. 7 Able to communicate effectively and cooperate in interdisciplinary and multidisciplinary teams</i></p> <p><i>CLO. 8 Have the responsibility and professional ethics</i></p> <p><i>CLO. 9 Able to motivate oneself to think creatively and learn throughout the life</i></p>	PLO-04
Content	<p><i>Mathematics Statistics II is one subject in the field of theory, which aims to master the basic concepts of mathematics to understand the theory of vectors, basic operations of Mathematics Statistics II, determinants, inverses, random vectors, systems of linear equations, vector spaces, values and eigenvectors. Besides that, students able to use this concept for processing random variables, formulating modeling and calculating univariate and multivariate calculations. To achieve this goal, the learning strategy used is discussion and practice both manually and with a computer program package</i></p>	
Study and examination requirements and forms of examination	<ul style="list-style-type: none"> • In-class exercises • Assignment 1, 2, 3 • Mid-term examination • Final examination 	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	<ol style="list-style-type: none"> 1. Hogg, R.V. and Craig, A.T., 1995. <i>Introduction to Mathematical Statistics</i>. 5th edition. New York: Mac Millon. 2. Lindenganren, B.W., 1976. <i>Statistical Theory</i>. 3th edition. New York: Mac Millon. 3. Mood, A.M., Graybill, F.A. and Boes, D.C., 1974. <i>Introduction of the Theory of Statistics</i>. 4th edition. Tokyo: Mc-Graw Hill. 4. Rice, J.A., 1995. <i>Mathematical Statistics and Data Analysis</i>. 2nd edition. Belmont, California: Duxbury Press. 5. Rohatgi, V.K., 1976. <i>An Introduction to Probability Theory and Mathematical Statistics</i>. New York: Wiley dan Sons. 	

Bahan Kajian <i>Study Materials</i>	Dasar Sains, Teori Statistika, dan Pemodelan <i>Basic of Science, Statistical Theory, and Modeling</i>
CPL yang dibebankan MK <i>PLO</i>	CPL-1 Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi CPL-4 Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah statistika di berbagai bidang terapan <i>PLO-1 Able to apply knowledge of statistical theory, mathematics, and computation</i> <i>PLO-4 Able to identify, formulate, and solve statistical problems in various applied fields</i>
CP-MK <i>CLO</i>	CPMK.1 Menguasai konsep distribusi sampling, penaksiran, metode penentuan penaksir, sifat-sifat penaksir, fungsi kerugian dan resiko, statistik kecukupan, Keluarga eksponensial, ketidakbiasan, equivariance, uniformly most powerfull test, ketidakbiasan untuk uji hipotesis, hipotesis linier CPMK.2 Dapat memformulasikan permasalahan distribusi sampling, penaksiran, metode penentuan penaksir, sifat-sifat penaksir, fungsi kerugian dan resiko, statistik kecukupan. Keluarga eksponensial, ketidakbiasan, equivariance, uniformly most powerfull test, ketidakbiasan untuk uji hipotesis, hipotesis linier CPMK.3 Dapat menyelesaikan distribusi sampling, penaksiran, metode penentuan penaksir, sifat-sifat penaksir, fungsi kerugian dan resiko, statistik kecukupan, Keluarga eksponensial, ketidakbiasan, equivariance, uniformly most powerfull test, ketidakbiasan untuk uji hipotesis, hipotesis linier CPMK.4 Dapat memilih metode penentuan distribusi sampling, penaksiran, statistik uji. CPMK.5 Dapat beradaptasi terhadap terhadap masalah penaksiran dan pengujian hipotesis 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 <i>CLO. 1 Master the concepts of sampling distribution, assessment, estimator determination methods, estimator properties, loss and risk functions, statistical adequacy, exponential family, unfamiliarity, equivariance, uniformly most powerful test, unfamiliarity for hypothesis testing, linear hypothesis</i> <i>CLO. 2 Can formulate problems of distribution of sampling, estimation, method of determining estimators, the properties of the estimators, the loss and risk functions, the adequacy statistics. Exponential family, unfamiliarity, equivariance, uniformly most powerful test, unfamiliarity for hypothesis testing, linear hypothesis.</i> <i>CLO. 3 Can complete sampling distribution, estimation, estimation method, estimator properties, loss and risk function, adequacy statistic, exponential family, unfamiliarity, equivariance, uniformly most powerful test, unfamiliarity for hypothesis testing, linear hypothesis</i> <i>CLO. 4 Can choose the method of determining the distribution of sampling, estimation, test statistics.</i> <i>CLO. 5 Can adapt to the problem of estimating and testing the hypothesis.</i> <i>CLO. 7 Able to communicate effectively and cooperate in interdisciplinary and multidisciplinary teams</i> <i>CLO. 8 Have the responsibility and professional ethics</i> <i>CLO. 9 Able to motivate oneself to think creatively and learn throughout the life</i>

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>
1-2	1. Mampu menjelaskan konsep distribusi sampling	Distribusi sampling	Ceramah, diskusi dan latihan soal	300 menit	Tes tulis Tugas 1 Observasi di kelas	1.1. Mampu menjelaskan dan memberi contoh tentang distribusi sampling. 1.2. Mampu menentukan distribusi sampling Binomial, Geometrik, Hipergeometrik, Binomial negative 1.3. Mampu menentukan distribusi sampling Uniform, Gamma, Eksponensial, Normal, normal bivariat, beta, weibull	10%/10%
1-2	1. <i>Able to explain the concept of sampling distribution Sampling</i>	<i>Sampling Distribution</i>	<i>Lecture, discussion and question exercises</i>	<i>300 minutes</i>	<i>Written test Task 1 Observation in class</i>	1.1. <i>Able to explain and give examples of sampling distribution.</i> 1.2. <i>Able to determine binomial, geometric, hypergeometric, negative binomial</i> 1.4. <i>sampling distribution Able to determine Uniform, Gamma, Exponential, Normal, bivariate, beta, weibull</i>	10%/10%
3-4	2. Mampu menjelaskan definisi penaksiran titik, penaksiran interval	Penaksiran, penaksiran titik, penaksiran interval metode penentuan penaksir	Ceramah, diskusi dan latihan soal	300 menit	Tes tulis Tugas 1 Observasi di kelas	2.3 Mampu menerangkan, memberi contoh ukuran kualitas penaksiran, penaksiran titik, penaksiran interval. 2.4 Mampu menerapkan metode penentuan penaksiran pada berbagai distribusi 2.5 Mampu mengetahui kelebihan dari masing-masing metode penentuan penaksiran tersebut.	15%/25%

3-4	2. <i>Able to explain definitions of point estimate, estimate interval</i>	<i>estimate, point estimate , Interval estimation method of determining estimator</i>	<i>Lecture, discussion and question exercise</i>	<i>300 minutes</i>	<i>. Written test Task 1 Observation in class</i>	<p>2.3 <i>Able to explain, give examples of assessment quality measures, point assessment, estimate interval.</i></p> <p>2.4 <i>Be able to apply the method of determining estimation to various distributions.</i></p> <p>2.6 <i>Be able to know the advantages of each method of determining the estimation.</i></p>	<i>15% / 25%</i>
5-6	3. Mampu menjelaskan sifat-sifat penaksir, fungsi kerugian dan resiko	Sifat-sifat penaksir, fungsi kerugian dan resiko	Ceramah, diskusi dan latihan soal	200 menit	Tes tulis Tugas 2 Observasi di kelas	<p>3.1 Dapat menerangkan dan menghubungkan sifat-sifat penaksiran, fungsi resiko, penaksiran admissible, minimax</p> <p>3.2 Mampu menentukan sifat-sifat penaksir parameter dari distribusi diskrit dan kontinyu</p>	10%/35%
5-6	3. <i>Be able to explain the properties of the estimator, the loss function and the risk</i>	<i>Estimator characteristics, the loss and risk functions</i>	<i>Lecture, discussion and question exercises</i>	<i>200 minutes</i>	<i>Written test Task 2 Observation in class</i>	<p>3.1 <i>Can explain and relate characteristics assessment, risk function, admissible estimation, minimax</i></p> <p>3.3 <i>Able to determine parameter estimator properties of discrete and continuous distributions</i></p>	<i>10% / 35%</i>
6-7	4. Mampu menjelaskan konsep Keluarga Eksponensial , statistik kecukupan, kriteria faktorisasi statistik kecukupan minimal	Keluarga Eksponensial Statistik Kecukupan.	Ceramah, diskusi dan latihan soal	300 menit	Tes tulis Tugas 2 Observasi di kelas	4.1 Dapat menerangkan, memberi contoh Keluarga Eksponensial ,statistik kecukupan, kriteria faktorisasi statistik kecukupan minimal dari distribusi diskrit dan kontinyu baik untuk satu dan beberapa parameter.	15%/50%

6-7	4. <i>Able to explain the concept of exponential family, statistical adequacy, statistical factorization criteria for minimum adequacy of</i>	<i>family exponential statistical adequacy.</i>	<i>Lecture, discussion and practice questions</i>	<i>300 minutes</i>	<i>Written test Task 2 Observation in class</i>	<i>4.2 Can explain, give examples of exponential families, statistical adequacy, statistical factorization criteria for minimum adequacy of discrete and continuous distributions for both one and several parameters.</i>	<i>15% / 50%</i>
ETS/ Mid Term Examination							
10	5. Mampu menjelaskan konsep Ketidakbiasan	Ketidakbiasan	Ceramah, diskusi dan latihan soal	150 menit	Tes tulis Tugas 2 Observasi di kelas	5.1. Mampu menjelaskan dan menentukan penaksiran UMVU pada masalah satu atau dua sampel pada distribusi normal dan eksponensial 5.2. Mampu menentukan penaksir UMVU pada distribusi diskrit	10%/60%
10	5. <i>Able to explain the concept of Irregularities</i>	<i>Unusual</i>	<i>Lectures, discussions and practice questions</i>	<i>150 minutes</i>	<i>Written test Task 2 Observations in class</i>	<i>5.1. Be able to explain and determine UMVU estimates for one or two sample problems in normal and exponential distributions 5.2. Able to determine UMVU estimator at discrete distribution</i>	<i>10% / 60%</i>
11	6. Mampu menjelaskan konsep Equivariance	Equivariance	Ceramah, diskusi dan latihan soal	150 menit	Tes tulis Tugas 3 Observasi di kelas	6.1. Mampu menjelaskan pengertian parameter lokasi, skala. 6.2. Dapat menerangkan, menentukan Equivariance pada model linier.	10%/70%
11	<i>Able to explain the concept of Equivariance</i>	<i>Equivariance</i>	<i>Lecture, discussion and practice questions</i>	<i>150 minutes</i>	<i>Written test Task 3 Observation in class</i>	<i>6.1. Able to explain the definition of location and scale parameters. 6.2. Can explain, determine Equivariance in a linear model.</i>	<i>10% / 70%</i>
12-13	7. Mampu menjelaskan konsep Pengujian	Pengujian Hipotesis	Ceramah, diskusi dan latihan soal	300 menit	Tes tulis Tugas 4	7.1. Mampu menjelaskan tentang konsep pengujian hipotesis	15%/85%

12-13	<p>Hipotesis, penentuan statistik uji</p> <p>6. <i>Able to explain the concept of Hypothesis Testing, determining test statistics for</i></p>	<i>Hypothesis Testing</i>	<i>Lectures, discussions and exercises</i>	300 minutes	<p>Observasi di kelas</p> <p><i>Written test Task 4 Observation in class</i></p>	<p>7.2. Mampu menentukan statistik uji untuk berbagai hipotesis dengan menggunakan metoda teorema N-P, UMPT, GLRT, baik Variabel random diskrit dan kontinyu.</p> <p><i>7.1. Be able to explain the concept of hypothesis testing</i></p> <p><i>7.2. Able to determine test statistics for various hypotheses using the theorem method NP, UMPT, GLRT, both discrete and continuous random variables.</i></p>	15% / 85%
14-15	<p>8. Mampu menjelaskan konsep pengujian Hipotesis untuk proporsi, dua proporsi, Uji selisih dua mean, Uji beda dua variasi</p> <p><i>Able to explain the concept of Hypothesis testing for proportions, two proportions, test the difference between two means, test for difference between two variations</i></p>	<p>Pengujian Hipotesis proporsi, dua proporsi, Uji selisih dua mean, Uji beda dua variasi</p> <p><i>Hypothesis testing of proportions, two proportions, test the difference between two means, test difference between two variations</i></p>	<p>Ceramah, diskusi dan latihan soal</p> <p><i>Lecture, discussion and exercise</i></p>	300 menit	<p>Tes tulis Tugas 4 Observasi di kelas</p> <p><i>Written test Task 4 Observation in class</i></p>	<p>8.1. Dapat menerangkan, dan menerapkan , UMPT, GLRT pada uji proporsi, dua proporsi, Uji selisih dua mean, Uji beda dua variasi</p> <p><i>8.1. Can explain, and apply, UMPT, GLRT to the test of proportion, two proportions, test of difference of two means, test of difference of two variations of</i></p>	15%/100%
14-15				300 minutes			15% / 100%
EAS/ Final Examination							

PUSTAKA :

- Hogg, R.V. dan Craig, A.T. (1995). Introduction to Mathematical Statistics, 5th ed. Mac Millon. New York.
- Mood, A.M., Graybill, F.A. dan Boes, D.C. (1974). Introduction of the Theory of Statistics. 4th ed. Mc-Graw Hill. Tokyo.
- Rice, J.A. (1995). Mathematical Statistics and Data Analysis. Second Ed. Duxbury Press. Belmont, California.
- Lindgren, B.W. (1976). Statistical Theory. 3th ed. Mac Millon. New York.
- Rohatgi, V.K. (1976). An Introduction to Probability Theory and Mathematical Statistics. Wiley & Sons. New York.