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Faculty of Mathematics and Natural Sciences
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MODULE HANDBOOK

Module designation	<i>Mathematical Statistics 1</i>
Semester(s) in which the module is taught	2
Person responsible for the module	<i>Siti Nurrohmah</i>
Language	<i>Indonesian</i>
Relation to curriculum	<i>Compulsory</i> <i>The module is shared with Statistics and Actuarial Science undergraduate study programs.</i>
Teaching methods	<i>lecture</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload: 9 hours/week x 14 weeks + 5.5 hours/week x 2 weeks =137 hours.</i> <i>Contact hours : 3 hours (150 minutes lectures).</i> <i>Private study including examination preparation, specified in hours¹: 3 hours structured activities and 3 hours individual study per week.</i>
Credit points	3 SKS (4.77 ECTS)
Required and recommended prerequisites for joining the module	<i>Calculus 1 and Introduction to Data Science</i>

¹ When calculating contact time, each contact hour is counted as a full hour because the organisation of the schedule, moving from room to room, and individual questions to lecturers after the class, all mean that about 60 minutes should be counted.

<p>Module objectives/intended learning outcomes</p>	<p><i>After completing the course, students have the ability</i></p> <ol style="list-style-type: none"> 1. <i>to determine the probability of an event and its conditional probability.</i> 2. <i>to identify random variable and probability density function.</i> 3. <i>to determine the cumulative distribution function.</i> 4. <i>to determine the distribution of a random variable function using the distribution function technique.</i> 5. <i>to determine mathematical expectation and moment generating function (mgf).</i> 6. <i>to determine the joint distribution of two random variables.</i> 7. <i>to determine conditional distribution and expectations.</i> 8. <i>to determine the coefficient of correlation and independence between two random variables</i> 9. <i>to apply theories of the distribution of two random variables for use in the distribution of more than two random variables</i> 10. <i>to determine the characteristics of several distributions for discrete random variables such as Uniform, Binomial, Trinomial, Multinomial, Negative Binomial, Geometric, Hypergeometric and Poisson distributions.</i> 11. <i>to determine the characteristics of several distributions for continuous random variables such as Uniform, Gamma, Chi-square, and Exponential, Normal and Bivariate Normal distributions.</i> 12. <i>to determine the distribution of statistic using distribution function techniques, random variable transformation techniques and mgf techniques.</i> 13. <i>to determine the expectations of the random variable functions.</i>
<p>Content</p>	<ol style="list-style-type: none"> 1. <i>The probability set function, conditional probability and independence.</i> 2. <i>Random variable of the discrete type and continuous type.</i> 3. <i>Properties of distribution function.</i> 4. <i>Expectation of random variable and some special expectations.</i> 5. <i>Distribution of two random variables.</i> 6. <i>Conditional distributions and expectations.</i> 7. <i>The correlation coefficient and independent random variable.</i> 8. <i>Extension to several random variables.</i> 9. <i>Binomial and related distribution and Poisson distribution.</i> 10. <i>Gamma and chi-square distributions, normal distribution and bivariate normal distribution.</i> 11. <i>Sampling theory, transformation of variables of discrete type, transformation of variables of continuous type and mgf technique.</i> 12. <i>Beta, t and F distribution.</i> 13. <i>Extension of the change of variable technique.</i> 14. <i>Distribution of \bar{X} and nS^2/σ^2.</i> 15. <i>Expectations of Functions of Random Variables.</i>
<p>Examination forms</p>	<ol style="list-style-type: none"> 1. <i>Class activities : Quiz and homework.</i> 2. <i>Mid-term examination.</i> 3. <i>Final examination.</i>

<p>Study and examination requirements</p>	<p><i>The final mark will be weighted as follows:</i></p> <ol style="list-style-type: none"> 1. <i>Mid-term examination (30%).</i> 2. <i>Final examination (30%).</i> 3. <i>Homework (20%).</i> 4. <i>Quiz (15%).</i> 5. <i>Active participation in class (5%)</i> <p><i>To successfully pass the module it requires minimum 55% of the total mark.</i></p> <table border="0"> <thead> <tr> <th style="text-align: left;"><i>Mark</i></th> <th style="text-align: left;"><i>Grade</i></th> </tr> </thead> <tbody> <tr> <td>85 - 100</td> <td>A</td> </tr> <tr> <td>80 - <85</td> <td>A-</td> </tr> <tr> <td>75 - <80</td> <td>B+</td> </tr> <tr> <td>70 - <75</td> <td>B</td> </tr> <tr> <td>65 - <70</td> <td>B-</td> </tr> <tr> <td>60 - <65</td> <td>C+</td> </tr> <tr> <td>55 - <60</td> <td>C</td> </tr> <tr> <td>40 - < 55</td> <td>D</td> </tr> <tr> <td>< 40</td> <td>E</td> </tr> </tbody> </table>	<i>Mark</i>	<i>Grade</i>	85 - 100	A	80 - <85	A-	75 - <80	B+	70 - <75	B	65 - <70	B-	60 - <65	C+	55 - <60	C	40 - < 55	D	< 40	E
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<p>Reading list (resources)</p>	<ol style="list-style-type: none"> 1. <i>Hogg R.V, ; Craig A.T. Introduction to Mathematical Statistics, 5th edition; Prentice-Hall, Inc, 1995.</i> 2. <i>Hogg R.V. ; Mc Kean J.W.; Craig A.T. Introduction to Mathematical Statistics, 8th edition, Pearson Education Inc, 2019</i> 3. <i>Asimow L.A. ; Maxwell,M.M. Probability & Statistics with Applications, ACTEX Pub Inc, 2010.</i> 4. <i>Lecturer's handout (powerpoint).</i> 5. <i>Videos</i> 																				