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|  | **Module Description/Course Syllabi** Study Programme: Bachelor of Mathematics Faculty of Mathematics and Natural Sciences Universitas Andalas |
| **1. *Course number and name*** |
| MAT 662253 Introduction to Stochastic Processes |
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| **2. *Credits and contact hours/Number of ECTS credits allocated*** |
| 3 SKS / 4,53 ECTS |
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| **3. *Instructors and course coordinator*** |
| 1. Dr. Dodi Devianto |
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| **4. *Text book, title, author, and year*** |
| 1. Ross, S. M. (1983). *Stochastic Processes*. John Wiley & Sons. New York.
2. Karlin, S. and Taylor, H. M. (1998). *An Introduction to Stochastic Modeling*. Academic Press. London.
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| **5. *Recommended reading and other learning resources/tools*** |
| 1. Brzezniak, Z. and Zastawniak T. (1999). *Basic Stochastic Processes*. Springer. New York.
2. Ross, S.M. (2003). *Introduction to Probability Models*. Academic Press. New York.
3. Durrett, R. (1999), *Essentials of stochastic processes*. Springer. New York
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| **6. *Specific course information*** |
| ***A. Brief description of the content of the course (catalog description)*** |
| This course applies Case Based Learning (Case Based Method; CBM), a learning method that uses cases as a medium for learning development. Students carry out exploration, assessment, interpretation, synthesis, analysis and case-based information to produce and develop a solution plan. This CBM-based learning provides knowledge about the concept of mathematical models based on probability which includes knowledge about Markov chains, Poisson processes, queuing and stochastic differential equation models and their applications. |
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| ***B. Prerequisites or co-requisites*** |
| MAT 61151 Data AnalysisMAT 62152 Mathematical Statistics I |
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| ***C. Indicate whether a required or elective course in the program*** |
| Elective |
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| ***D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)*** |
| First Cycle Bachelor |
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| ***E. Year of study when the course unit is delivered (if applicable)*** |
| 4th year |
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| ***F. Semester when the course unit is delivered*** |
| Even Semester |
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| ***G. Mode of delivery (face-to-face, distance learning)*** |
| Face to face |
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| **7. *Intended Learning Outcomes*** |
| ILO-1: Possesses a good ethics and integrity PI-2: Able to act in accordance with academic ethics PI-3: Able to act in accordance with academic integrityILO-2: Possesses profound knowledge of the basic concept mathematics PI-1: An ability to explain the basic concept mathematics PI-3: An ability to determine solution of the simple problems  using the basic concept mathematicsILO-3: An ability to identify, explain and generalise simple mathematical PI-1: An ability to identify simple mathematical problems PI-2: An ability to explain simple mathematical problems PI-3: An ability to generalise simple mathematical problemsILO-4: An ability to use concept and fundamental technique of mathematics in  solving simple mathematical problems PI-1: An ability to illustrate simple mathematical problems based on  appropriate basic mathematical concepts and techniques PI-3: An ability to solve simple mathematical problems using the  proper concept and mathematical fundamental techniquesILO-5: An ability formally and correctly proves a simple mathematical statements using facts and methods that have been studiedPI-1: An ability to identify the formal structures and analogy forms in mathematicsPI-2: An ability to use fact and apply methods in proving simple mathematical statementPI-3: An ability to present simple mathematical statement proof rigorously (sequentially and conscientious)PI-4: An ability to conclude or interpret result of the proving simple mathematical statementILO-6: An ability to communicate effectively especially in the area of mathematics in with diverse communitiesPI-1: Able to convey ideas or study results orally, especially in the field of mathematicsPI-2: Able to present ideas or study results in writing, especially in the field of mathematicsPI-3: Able to respond to feedback given |
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| **8. *Course Learning Outcomes*** |
| 1. Students are able to explain the theoretical concept of probability theory in stochastic processes.
2. Students are able to explain the concept of random variables, distribution functions and probability models and their relationship to the concept of Markov chains.
3. Students are able to explain the concept of the Poisson process and renewal process as well as the queuing model in various applications.
4. Students are able to use the concept of Brownian motion and Ito's stochastic calculus in various applications.
5. Students are able to reason intuitively and analytically and are able to express the results of their reasoning in writing, systematically and rigorously both individually and in groups.
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| **9. *Brief list of topics to be covered*** |
| 1. Introduction to probability theory.
2. Transformation of random variables into moment generating functions and characteristic functions.
3. Markov chains and transition probability matrices.
4. Poisson process and renewal process.
5. The process of birth and death in the queue model.
6. Brownian motion and Ito's stochastic calculus.
7. Stochastic differential equations and their applications.
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| ***10. Learning and teaching methods*** |
| Directed Learning, Teacher Center Learning, Presentation, Group Discussion, Project facilitator. |
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| ***11. Language of instruction*** |
| Indonesia and English |
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| ***12. Assessment methods and criteria*** |
| **Summative Assessment** : 1. Mid-term exam: 20%
2. Final exam: 20%
3. Assignment (home work): 10%
4. Project : 50%
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