UNIVERSITAS INDONESIA
Faculty of Mathematics and Natural Sciences
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MODULE HANDBOOK

Module designation	*Biomathematics*
Semester(s) in which the module is taught	*7*
Person responsible for the module	*Dr. Dipo Aldila*
Language	*Indonesian*
Relation to curriculum	*Elective*
Teaching methods	*Lecture, lab works, seminar.*
Workload (incl. contact hours, self-study hours)	*(Estimated) Total workload: 9 hours/week x 14 weeks + 5.5 hours/week x 2 weeks = 137 hours.* *9 hours/week divided into :* - *Contact hours: 3 hours (150 minutes lectures).* - *Study independent including examination preparation, specified in hours[1]: 3 hours structured activities and 3 hours individual study per week.*
Credit points	*3 SKS (4.77 ECTS)*
Required and recommended prerequisites for joining the module	*Mathematical modelling*

[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.

Module objectives/intended learning outcomes	*After completing the course, students have the ability* 1. *to explain and analyze a qualitative and quantitative behaviour of an exponential growth, logistic growth, logistic growth with Allee effect and logistic growth with fear factor model* 2. *to explain and analyze a qualitative and quantitative behaviour of a competing species models* 3. *to explain and analyze a qualitative and quantitative behaviour of a predator prey model* 4. *to explain and analyze a qualitative and quantitative behaviour of an SIR model* 5. *to explain and analyze a qualitative and quantitative behaviour of a vector borne disease model* 6. *to calculate and explain the sensitivity analysis of a dynamical system* 7. *to detect a type of bifurcation that appears from an epidemiological model*
Content	1. *Exponential growth, logistic growth, logistic growth with Allee effect and logistic growth with fear factor model* 2. *Competing species models* 3. *Predator prey model* 4. *The SIR model with demography* 5. *Vector-borne disease model* 6. *Sensitivity analysis of a dynamical system* 7. *Bifurcation analysis on an epidemiological model*
Examination forms	1. *Class activities : Quiz, homework.* 2. *Mid-term examination* 3. *Final examination*

<table>
<tr><td>Study and examination requirements</td><td>The final mark will be weighted as follows:
1. Quiz (25%)
2. Homework (15%).
3. Mid-term examination (30%)
4. Final examination (30%)
To succesfully pass the module it requires minimum 55% of the total mark.
<table><tr><td>Mark</td><td>Grade</td></tr><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></table></td></tr>
<tr><td>Reading list</td><td>1. Maia Martcheva, Texts in applied mathematics (Vol. 61) : An introduction to mathematical epidemiology, Springer-New York, 2015.
2. Richard Haberman, Mathematical models: mechanical vibrations, population dynamics, and traffic flow, SIAM-Philadelphia, 1998.</td></tr>
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