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MODULE HANDBOOK

Module designation	*Numerical differential equations*
Semester(s) in which the module is taught	*4*
Person responsible for the module	*Dr. Dipo Aldila*
Language	*Indonesian*
Relation to curriculum	*Compulsory*
Teaching methods	*Lecture, lab works, project*
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	*Ordinary differential equations and Numerical Method*

[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. *explaining properties of uniqueness of solutions on initial and boundary value problems* 2. *explaining properties well-posed and perturbed problems on initial value problems* 3. *implementing numerical methods to solve initial value problem on ODE* 4. *implementing shooting methods to solve a boundary value problems* 5. *implementing finite difference methods to solve an initial and boundary value problem on PDE.*
Content	1. *Unique solution on initial and boundary value problems* 2. *Well-posed and perturbed problems on initial value problems* 3. *Numerical method for ODE (Euler, Taylor and high order of Taylor, Runge-Kutta, multistep methods, more on errors (stability))* 4. *Shooting method for linear and nonlinear problem on boundary value problems* 5. *Finite difference (explicit scheme) for PDE* 6. *Finite difference (implicit scheme) for PDE*
Examination forms	1. *Class activities : Quiz (written and computer-based), homework.* 2. *Lab sessions* 3. *Mid-term examination* 4. *Final examination*

Study and examination requirements	*The final mark will be weighted as follows:* 1. *Online Quiz (10%)* 2. *Homework (15%).* 3. *Written Quiz (10%)* 4. *Lab sessions (15%)* 5. *Mid-term examination (25%)* 6. *Final examination (25%)* *To succesfully pass the module it requires minimum 55% of the total mark.* *Mark — Grade* *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*
Reading list	1. *Burden R.L. dan Faires J.D., 2011, Numerical Analysis, Brooks/Coles, Cengange Learning.* 2. *Boyce,W.E., DiPrima,R.C., Elementary Differential Equations and Boundary Value Problems, 9th edition, John Willey & Sons, 2008* 3. *Logan, J. D., Undergraduate Texts in Mathematics: Applied partial differential equations (3rd edition), Springer-Ney York, 2015.*