ICE-EM Access Grid Room Project

Subject Information Form

Note: Subject Information form due at ICE-EM preferably **30 January 2009** (latest 10 February 2009)
This form must be both electronically completed and transmitted.

Administration

1. Department and Institution

   School of Mathematics and Applied Statistics
   University of Wollongong

2. Subject name and code

   Non-Linear Differential Equations
   MATH971

3. Handbook entry URL, subject homepage URL, host honours student hand-out URL

   - Handbook entry URL
     N/A
   - Subject homepage URL
     `http://www.uow.edu.au/~mnelson/teaching.dir/math971.html`
   - Host Honours student hand-out URL
     There is no hand-out

4. **Lecturer** name and contact details

Name:	Dr M.I. Nelson
Phone:	02-4221-4400
Email:	mnelson@uow.edu.au
Homepage:	`www.uow.edu.au/~mnelson`

5. **Honours coordinator** name and contact details

Name:	Dr M.I. Nelson
Phone:	02-4221-4400
Email:	mnelson@uow.edu.au

6. Start date, end date, number of teaching weeks

Start date:	Week starting 9th March 2009
End date:	Week starting 1st June 2009
Number of teaching weeks:	12

7. Contact hours per week

   Three hours (two hours of lectures and a one-hour tutorial)

8. Description of electronic access arrangements for students (for example, Black Board)

   N/A

Academic

1. Overview of subject content

   This course provides an introduction to applied non-linear ordinary differential equations. This course is *applied mathematics*. There will be no technical lemmas or abstract definitions!

2. Detailed syllabus, preferably week by week

   Topics to be covered include (but are not limited to):

   - **First-order differential equation**: Graphical insights, steady-state solutions and their stability, steady-state diagrams and bifurcations.
   - **Singularity theory with a distinguished parameter**: singularity theory and bifurcation points, constructing static bifurcation diagrams.
   - **Systems of two first-order differential equations**
     - *steady-state solutions and their stability*: local and Liapunov.
     - *the absence of periodic solutions*: Bendixon's Criteria and Dulac's Test.
     - *periodic behaviour*: the Hopf bifurcation Theorem, sub-critical and super-critical hopf bifurcations.
     - *bifurcations and steady-state diagrams*: singularity theory and bifurcation points.
     - *degenerate Hopf bifurcations*: the double Hopf bifurcation, the Bautin bifurcation, the double-zero eigenvalue bifurcation.

3. Detailed breakdown of assumed prerequisite knowledge, including host prerequisite subject URLs

   No knowledge of applied mathematics is assumed. Little knowledge above first year calculus is required. It will be assumed that you have used Maple previously (but if not, you can pick it up). If you don't like Maple you are free to use an equivalent package.

4. Assessment

   - Exam/assignment/class work breakdown

     Your final mark in MATH971 will be determined as follows. Two marks will be calculated using scheme one (**S1**) and scheme two (**S2**).

Scheme	**S1**	**S2**
Exam	60 %	40 %
Assignments	40 %	60 %

     Your final mark will be the higher of the marks calculated using schemes one and two. *Scaling* of marks is *not* a standard procedure in this subject.

     Note that you are not required to 'pass' each individual component to receive a pass grade in MATH971. However, you would seriously jeopardise your chances of passing this subject if you do not aim to be successful in every component of the assessment.

   - Assignment due dates

     These will be given when assignments are handed out. Generally, students are given two weeks to complete assignments.

   - Approximate exam date

     Between 15th June and 26th June

5. Required student resources

   - Text/printed notes

     All lecture notes will be made available on the course web-page.

   - Software (local access)

     You will need access to Maple or an equivalent package.

Institutional Honours Details

1. Weight of subject in total honours assessment at host department

   12.5%

2. Thesis/subject split at host department

   25.0% /75.0% B.Math (Hons) and B.Stat (Hons)
   37.5% /62.5% B.Math.Adv (Hons) and B.Stat.Adv (Hons)

3. Honours grade ranges at host department

   H1 = 85–100 %
   H2a = 75–84 %
   H2b = 65–74 %
   H3 = 50–64 %