ICE-EM Access Grid Room Project

Subject Information Form

Administration

1. Department and Institution

   School of Mathematics and Statistics
   The University of Sydney

2. Subject name and code

   Geometric Singular Perturbation Theory (AMH9)

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

   - Handbook entry URL
     `http://www.maths.usyd.edu.au/u/UG/HM/`
   - Subject homepage URL
     `http://www.maths.usyd.edu.au/u/UG/HM/`
   - Host Honours student hand-out URL
     `http://www.maths.usyd.edu.au/u/UG/HM/`

4. **Lecturer** name and contact details

Name:	Martin Wechselberger
Phone:	(02) 9351 3860
Email:	martin.wechselberger@sydney.edu.au
Homepage:	`http://www.maths.usyd.edu.au/ut/people.html`

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

Name:	Martin Wechselberger
Phone:	(02) 9351 3860
Email:	martin.wechselberger@sydney.edu.au

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

Start date:	Semester 2, 2013
End date:	XXXX
Number of teaching weeks:	XXXX

7. Contact hours per week

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

Academic

1. Overview of subject content

   Physiological rhythms are central for life. Prominent examples are the beating of the heart, the activity of neurons, or the release of hormones regulating growth and metabolism. All these rhythms have in common, that they evolve on at least two different time scales, i.e. there exist a quasi steady state of the system on a slow time scale (e.g. the resting state of the heart) interspersed by a dramatic change of the system on a fast time scale (e.g. the heartbeat itself). Mathematical models of such systems are called slow/fast systems or multiple scales problems.

   In this unit we introduce a mathematical technique suitable for analysing such multiple scales problems called geometric singular perturbation theory. This perturbation theory is based on the fact that the system under study has a singular perturbation parameter and classical asymptotic analysis breaks down. The method is very powerful and is based on dynamical systems techniques like bifurcation theory and invariant manifold theory.

2. Detailed syllabus, preferably week by week

   XXXX

3. The only background needed is the basic theory of differential equations and bifurcation analysis introduced in, e.g., MATH3963 (http://www.maths.usyd.edu.au/u/UG/SM/MATH3963/)

4. Assessment

   - Exam/assignment/class work breakdown

Exam	50 %
Assignment	50 %
Class work	0 %

   - Assignment due dates
     XXXX
   - Approximate exam date
     XXXX

5. Required student resources

   - Text/printed notes
     XXXX
   - Software (local access)
     XXXX

Institutional Honours Details

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

   10%

2. Thesis/subject split at host department

   40% thesis
   60% course work (6x10%)

3. Honours grade ranges at host department

H1	=	80-100 %
H2a	=	75-79 %
H2b	=	70-74 %
H3	=	65-69 %