Department of Mathematics
Macquarie University
MATH332 Nonlinear Dynamics and Chaos 2008 D2

Lecturers.
Dr Ross MOORE E7A 419 (tel. 8955), ross@maths.mq.edu.au
Professor Paul SMITH E7A 402 (tel. 8944), pdsmith@maths.mq.edu.au

Lecture schedule (with occasional variation).
Wednesday 12–2 pm C5C 240 (Paul Smith)
Friday 12–2 pm C5A 313 (Ross Moore)

Assessment.
There will be 8 assignments, contributing 25% to your final mark. They are due at 10 am on the Tuesday of the relevant week. The final examination is of 3 hours duration and contributes 75% to your final mark.

Course Outline

<table>
<thead>
<tr>
<th>Week</th>
<th>Starting</th>
<th>Maps and Bifurcations</th>
<th>Continuous Dynamics</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 Aug</td>
<td>Introduction to dynamical systems.</td>
<td>Introduction; second order differential equations in the phase plane.</td>
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<tr>
<td>2</td>
<td>11 Aug</td>
<td>Iteration of 1-D maps: Stability criteria.</td>
<td></td>
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<tr>
<td>3</td>
<td>18 Aug</td>
<td>Period doubling.</td>
<td></td>
<td>Assgt 1 due</td>
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<tr>
<td>4</td>
<td>25 Aug</td>
<td>Period three, Sarkovskii’s theorem and chaos.</td>
<td>Limit cycles and periodic solutions.</td>
<td>Assgt 2 due</td>
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<tr>
<td>5</td>
<td>1 Sept</td>
<td>Linearisation.</td>
<td></td>
<td>Assgt 3 due</td>
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<tr>
<td>6</td>
<td>8 Sept</td>
<td>Limit cycles and periodic solutions.</td>
<td></td>
<td>Assgt 4 due</td>
</tr>
<tr>
<td>7</td>
<td>15 Sept</td>
<td>VACATION (2 weeks)</td>
<td></td>
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<tr>
<td>8</td>
<td>6 Oct</td>
<td>Linear maps; stable and unstable manifolds</td>
<td>Periodic solutions (ctd)</td>
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<tr>
<td>9</td>
<td>13 Oct</td>
<td>Forced oscillations; subharmonics, jump phenomena and chaos.</td>
<td>Assgt 5 due</td>
<td></td>
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<tr>
<td>10</td>
<td>20 Oct</td>
<td>Bifurcations in ODEs; chaos.</td>
<td>Assgt 6 due</td>
<td></td>
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<tr>
<td>11</td>
<td>27 Oct</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12</td>
<td>3 Nov</td>
<td></td>
<td>Assgt 7 due</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>10 Nov</td>
<td>Revision</td>
<td>Assgt 8 due</td>
<td></td>
</tr>
</tbody>
</table>

Website.
http://rutherglen.ics.mq.edu.au/math332s208

Texts.
The following texts provide useful references for various sections of the course:

**Expected Participation.**
Students are expected to demonstrate their participation in this unit by submitting reasonable attempts to at least six (6) of the six (8) assignments. Please contact one of the lecturers in case of difficulty over any of these. A note submitted through the Student Centre or a medical certificate will not exempt you from missing assignments. You may be asked instead to submit a late assignment. Past experience clearly indicates that students who do not attempt assignments throughout the semester rarely perform well in the final examination.

**Unavoidable Disruption to Studies.**
If illness or misadventure makes it impossible for you to attend the examination, or interferes significantly with your performance in the examination, then you are entitled to request special consideration. If we are satisfied, either by your previous performance in the unit or by the quality of work you have been able to produce in the examination, that there is evidence that you have not been able to show your true ability, then we may decide to invite you to attend a special examination to resolve your grade for the unit. Please note the following:

* See Rule 9 (1) and 9 (2) of Bachelor Degree Rules, concerning examinations, on page 98 in the 2008 Handbook of Undergraduate Studies.
* Every student is entitled to apply for special consideration, and each application is considered on its merits. However, it is the decision of the Division whether to offer a special examination or not. As a general rule, a special examination is offered if illness or misadventure interferes with an otherwise satisfactory performance. Consequently, a special examination is not offered unless all criteria concerning expected participation have been satisfied.
* Students cannot apply for a special examination, nor should expect to be granted one automatically; requests "to sit for special examination" are not looked upon with favour.
* The examination period for this semester is between 19-11-2008 and 5-12-2008. Please note that special consideration cannot be made for those who have merely made inappropriate travel arrangements.
* It is essential that you notify the Registrar in writing of the misadventure, accompanied by any appropriate documentary evidence.
* The purpose of the special examination is to resolve the temporary difficulty caused by your illness or misadventure, not to give you an advantage over other students by allowing you extra time to study. We will therefore hold the special examination as soon
as possible. In determining your grade for a special examination, we may also take into account the possibility of extra study time available to you.

* In view of the previous paragraph, you must make sure that you are readily available to be contacted, and must hold yourself available to attend the special examination at short notice on the date and time the Division sets. This is provisionally set for 19-12-2008. If you are granted permission to sit a special examination, you will be notified by email via the Student Portal (see the section “Official Communication from the University” below). Please note that you will receive no other notification. However, the decision of all requests for special consideration will also be posted on the ICS website http://www.ics.mq.edu.au/. The results will be listed by student ID only.

* If you elect to be away from Sydney during the special examination, or cannot be contacted, or are unavailable to attend the special examination, then the Division will accept this as a firm indication that any request you may have submitted for special consideration does not apply to this unit.

**Plagiarism.**

Plagiarism involves using the work of another person and presenting it as one's own. Any of the following acts constitutes plagiarism unless the source of each quotation or piece of borrowed material is clearly acknowledged:

* copying out part(s) of any document or audio-visual material (including computer based material);
* using or extracting another person's concepts, experimental results, or conclusions;
* summarizing another person's work;
* in an assignment where there was collaborative preparatory work, submitting substantially the same final version of any material as another student.

Encouraging or assisting another person to commit plagiarism is a form of improper collusion and may attract the same penalties which apply to plagiarism. Any student suspected of plagiarism may be asked for an explanation in the first instance. If no satisfactory explanation is forthcoming, the student may be penalized by being awarded negative full marks for the assignment(s) concerned. Any further infringement will be reported to the University for consideration by the Disciplinary Committee. Please see the section concerning plagiarism on page 47-48 in the 2008 Handbook of Undergraduate Studies.

**Official Communication from the University**

The Student Portal is now the mandated point of contact for many official communications from the University. In most cases there is no associated paper based communication.

You should regularly (at least weekly) open your Portal page and check for official communications from the University. Failure to do so could result in a situation that compromises your academic progress. For example, you may be removed from the graduation list because of outstanding Library fines, which you were unaware of because of not regularly accessing your Portal page.

Please note that there is a built-in option for forwarding Portal mail to another e-mail address, should you wish to do this.