



**UNSW SCIENCE**  
**School of Maths and Statistics**

**Course outline**

**MATH3201 / MATH5295**  
**Dynamical Systems and Chaos**

**Term 3, 2022**

**Staff**

Position	Name	Email	Room
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**Course**

## Late Submission of Assessment Tasks

No late submissions will be accepted. (Where "late" in this context means after any extensions granted for Special Consideration or Equitable Learning Provisions.)

## Course Learning Outcomes (CLO)

- x CLO1: Model dynamical phenomena and demonstrate an understanding of those phenomena at a deeper level than in previous courses
- x CLO2: Demonstrate the utility of the mathematics learned prior to the course and show the connection between dynamical systems and those other mathematics subjects
- x CLO3: Demonstrate development in problem solving skills as applied to dynamical systems
- x CLO4 Display advanced competency in mathematical presentation

## Course Schedule

The course will include material taken from some of the following topics. This is should only serve as a guide as it is not an extensive list of the material to be covered and the timings are approximate. The course content is ultimately defined by the material covered in lectures.

Weeks	Topic
1	<i>Discrete-time dynamics</i> : periodic points, stable/unstable sets, graphical analysis of maps, linearization around periodic orbits, derivative condition for stability of a periodic orbit, topological conjugacy.
2	<i>Discrete-time dynamics</i> : invariant sets, topological transitivity, sensitive dependence on initial conditions, chaos, Lyapunov exponents, measure-preserving transformations, Poincare Recurrence Theorem, ergodicity.
3	<i>Discrete-time dynamics</i> : linear maps in $\mathbb{R}^n$ , hyperbolicity, stable/unstable subspaces, linearization about fixed and periodic points in $\mathbb{R}^n$ , global dynamics of the Henon map, Hartman-Grobman Theorem.
4	<i>Discrete-time dynamics</i> : Stable Manifold Theorem, Inclination Lemma, chaotic attractors. <i>Continuous-time dynamics</i> : ODEs and flow maps.
5	<i>Continuous-time dynamics</i> : general form of solutions for linear flows, phase portraits and classification of linear flows, unstable/stable/centre subspaces, hyperbolic linear flows.
7	<i>Continuous-time dynamics</i> : linearization about hyperbolic fixed points, Hartman-Grobman Theorem for flows, stable/unstable manifolds of fixed points, global dynamics of the pendulum, periodic orbits, invariant sets.
8	<i>Continuous-time dynamics</i> :

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## **Equitable Learning Services (ELS)**

If you suffer from a chronic or ongoing illness that has, or is likely to, put you at a serious disadvantage, then you should contact the Equitable Learning Services (previously known as SEADU) who provide confidential support and advice.

They assist students:

- x living with disabilities
- x with long- or short-term health concerns and/or mental health issues
- x who are primary carers
- x from low SES backgrounds
- x of diverse genders, sexes and sexualities
- x from refugee and refugee-like backgrounds
- x from rural and remote backgrounds
- x who are the first in their family to undertake a bachelor-level degree.

Their web site is: <https://student.unsw.edu.au/els/services>

Equitable Learning Services (ELS) may determine that your condition requires special arrangements for assessment tasks. Once the School has been notified of these, we will make every effort to meet the arrangements specified by ELS.

Additionally, if you have suffered significant misadventure that affects your ability to complete the course, please contact your Lecturer-in-charge in the first instance.

## **Academic Skills Support and the Learning Centre**

The Learning Centre offers academic support programs to all students at UNSW Australia. We assist students to develop approaches to learning that will enable them to succeed in their academic study. For further information on these programs please go to:

<http://www.lc.unsw.edu.au/services-programs>

## **Applications for Special Consideration for Missed Assessment**

Please adhere to the Special Consideration Policy and Procedures provided on the web page below when applying for special consideration. <https://student.unsw.edu.au/special-consideration>

Please note that the application is not considered by the Course Authority, it is considered by a centralised team of staff at the Nucleus Student Hub.

The School will contact you (via student email account) after special consideration has been

