

# Nonlinear Control - ELEC9422

Session II 2006

**Instructor:** Victor Solo  
**E-Mail:** v.solo@unsw.edu.au  
**Class Times:** Mon 6pm-9pm  
**Web-Page:** TBA

Office: EET 237  
[use subject: ELEC9422]  
Room: EET G3

**Topics:**

- Part I - Nonlinear systems analysis methods:  
phase plane, describing functions, Lyapunov stability
- Part II - Nonlinear Control system design and analysis  
feedback linearization, sliding mode, Lyapunov design - backstepping

**Grading:** (percentages may change as necessary)

Homework	30%
Final Exam (Take-home)	40%
Project (Report + talk)	30%

Homeworks are to be completed on your own. You may consult with other students in the class while you are solving a problem, but the work that you hand in (and any related working) must be yours alone.

Exams are to be completed on your own. You may NOT consult with others. The work that you hand in (and any related working) must be yours alone.

**Project :** 1 page (two-column format) proposal due week 5 (Mon August 21).  
One independent report from each student + oral presentation.  
Use IEEE-CDC style (max 6-10pp) for the report.  
1-3 students per group.

All projects involve SIMULINK modelling.

Available projects are:

Hovercraft modelling and control

Bicycle modelling and control

Spherical Pendulum modelling and control

or

A relevant project of interest proposed by the student and approved by the instructor.

**Textbook:** none.

**References:** J J Slotine and W Li (1991)  
 Applied Nonlinear Control (Prentice Hall).  
 H Khalil (1996,2002)  
 Nonlinear Systems (Prentice Hall)  
 S Sastry (1999)  
 Nonlinear Systems (Springer).  
 A Isidori (1995).  
 Nonlinear Control (Springer).

**Software:** Matlab including Simulink  
 dfield, pplane from <http://math.rice.edu/~dfield/>

**Homework, Exam, Project Timetable**

Item	Dates	
HW 1	out - Mon August 21	due - Mon September 4
HW 2	out - Mon September 4	due - Mon September 18
HW 3	out - Mon September 18	due - Mon October 9
Project	proposal due Mon August 21	report due - Mon October 30
	Talks will be the week of October 23	
Final	out - Monday October 30	due - Mon November 13