ECE 561: Nonlinear Control Systems

Instructor information	Name: Mahdi Tavakoli Office: 13-360 Donadeo Innovation Centre for Engineering (ICE) Telephone: 780-492-8935 E-mail: mahdi.tavakoli@ualberta.ca Office hours: Mondays, Wednesdays and Fridays 1:00-2:00 pm
Schedule information	Lecture times: Wed Fri, 9:00-10:20 am Lecture location: ECE W6 006 Midterm exam: Friday Oct 30, 09:00 -10:20 am in the lecture room Final exam: Will be scheduled by the Office of the Registrar and Student Awards
Course webpage	https://eclass.srv.ualberta.ca/ A number of PowerPoint presentations have been posted on this website already. They are incomplete now, will be completed in class, and re-posted to the website. I recommend that you print and bring your copy of the incomplete notes to the class, and add your notes on them as I am writing on the slides.
Course content	The course presents an introduction to nonlinear phenomena as well as techniques for analysis and design of nonlinear control systems. • Introductory examples; 2nd order systems • Mathematical Tools • Lyapunov Stability: Autonomous and non-autonomous Systems • Feedback Systems: Integrator back-stepping • Feedback linearization • Input-Output Stability • Input-to-State Stability • Passivity
Marking scheme	• Assignments: 5% • Midterm exam: 35% • Final exam: 60%
Textbook and selected references	• Nonlinear Control Systems: Analysis and Design, by H. J. Marquez, Wiley, 2003. Errata: http://www.ece.ualberta.ca/~marquez/Marquez_errata.pdf Additional reading: • Nonlinear Systems, by H. K. Khalil, 3rd edition, Prentice Hall, 2002. • Applied Nonlinear Control, by Jean-Jacques Slotine and Weiping Li, Prentice Hall, 1990.
MATLAB / Simulink	• Certain assignments may require knowledge of MATLAB/Simulink.
Assignments	• Five to six assignments will be posted on the course website. Each assignment will be due one week after it is posted by 4:00 pm at the ECE 561 assignment box located on the 2nd floor of ICE in the north/south hallway. • Assignments put in the box after 4:00 pm on the due date and before they are picked up will receive a 25% penalty. No late assignments will be accepted once the box has been emptied. • Consultation with other students is permitted; however, the solutions handed in must be your own work. • Assignments will be marked roughly and returned to you at the end of the term.

Important policies	• Policy about course outlines can be found in Section 23.4(2) of the University Calendar. • The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour and *avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence*. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University. • Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan. • Missed midterm exam and missed final exam can only be justified by documented medical evidence. Note the following new policy: ○ **83.3(11) Missed Term and Final Exams:** Refer to §§23.3 and 23.4. There are no deferred term exams for courses offered in the Faculty of Engineering. In instances where a student has a documented reason for missing a term exam(s) and at the discretion of the instructor, the value of a missed term exam(s) can be added to the value of the final exam. A missed term exam(s) is considered assigned term work which has not been completed in determining eligibility for a deferred final exam. If the resulting final exam weight exceeds that allowed under §23.4(1), then any accommodation will be at the discretion of the Dean of Engineering. ○ **23.4(1) Weighting of Term Work and Final Examinations:** In each course in which a final examination is held, a weight of not less than 30 percent and not more than 70 percent will be assigned to the final examination, except where a departure from this arrangement has been authorized by the council of the Faculty in which the department offering the course is situated. The remaining weight for the course will be assigned to term work. The above means that the authority to approve beyond a 70% total of mid term and final exams is at the discretion of the Dean (delegated to the Associate Dean, Student and Co-op Services).
Calculator and formula sheet	• You may use *approved non-programmable* calculators (with a gold sticker) in the midterm and final exams as long as in compliance with the Faculty of Engineering's Calculator Policy: http://www.engineering.ualberta.ca/calculator.cfm. Obviously, calculators must not be used for any kind of cheating or communication with other students during exams. • In the midterm exam, you can bring one formula sheet (letter size, two sided). You can bring two such formula sheets in the final exam. No books, notes, or other materials will be allowed in either exam.