

ME4231 MOTION CONTROL LABORATORY

FALL 2009

INSTRUCTOR

Prof. Rajesh Rajamani

Office: ME 203

Office Hour: Friday, 11.10 am – 12.10 pm

e-mail: rajamani@me.umn.edu

LECTURE HOURS AND LOCATION

Friday, 9.05 am – 11.00 am, Rapson Hall 58

TEACHING ASSISTANTS

TA	Sections taught	e-mail
Peng Peng	Section 1: Mon, 2.30 pm – 5.30 pm Section 3: Tue, 2.30 pm – 5.30 pm	pengpeng@me.umn.edu
Sean Pruden	Section 2: Tue, 9.05 am – 12.05 pm Section 6: Thu, 9.05 am – 12.05 pm	prud0035@umn.edu
Kalpesh Singal	Section 4: Wed, 9.05 am – 12.05 am	ksingal@me.umn.edu
Saber Taghvaeeyan	Section 5: Wed, 2.30 pm – 5.30 pm	saber@me.umn.edu

TA OFFICE HOURS

Held by	Hours	Location
Peng Peng	Mon, 2.00 pm – 2.30 pm Tue, 2.00 pm – 2.30 pm	ME-262 ME-262
Sean Pruden	Tue, 8.35 am – 9.05 am Thu, 8.35 am – 9.05 am	ME-262 ME-262
Kalpesh Singal	Wed, 8.35 am – 9.05 am	ME-262
Saber Taghvaeeyan	Wed, 2.00 pm – 2.30 pm	ME-262

COURSE STRUCTURE

A two-hour lecture will be given each week. The purpose of the lecture is to prepare you for the labs and to give you an overview of possible applications of the technology presented in the labs. You are encouraged to actively participate in the lectures by asking questions and providing suggestions.

A 5-minute quiz will be held at the beginning of every lecture (starting from lecture 2). This will consist of multiple choice questions and will evaluate your knowledge of the lab completed the previous week.

Three-hour labs are scheduled each week. The information related to the lab sessions are contained in lab manuals which will be distributed in class and can also be found online on the course website. Most of the labs require preparation (prelabs) that must be completed by YOU prior to the lab. The TA will check to make sure all preparation material is completed at the beginning of each lab session. The necessary material to prepare for the lab is contained in the lab manual. **Remember: prelabs are like the keys to the labs, you must have a prelab to be able to start the lab.**

Almost all labs have a postlab report requirement. Postlabs are due a week after completing the lab. For example, when you are coming into the lab for Lab 4 you have to have the postlab for Lab 3 and the prelab for Lab 4 ready. Postlabs usually have problems to be solved related to the lab material and are usually expected to include the experimental results and parts of the programs you wrote in the lab as well.

Copying prelabs and postlabs from each other is strictly forbidden. **New changes have been made to program pieces that will be distributed throughout the semester.** Any attempt to use the programs from past semesters will be considered as cheating and are easy for the TAs to catch. **It is your responsibility to know the policies regarding academic honesty and integrity. Check the University's Office for Student Academic Integrity website at: <http://www.osai.umn.edu/>**

GRADING

- **70 %** Pre and post laboratory reports
- **10 %** Weekly Quizzes
- **20 %** Final exam.
- The relative weight of the pre and postlab reports towards the total grade for a lab session changes for each lab and will be posted in the lab manuals.
- The final exam consists mostly of multiple choice type problems and contains topics covered both during the lecture and the labs. It is aimed at testing the students' understanding of the theoretical aspects described in the lectures and the experiments performed in the lab sessions throughout the semester.
- Postlab reports are due in the lab session one week after the lab is completed. Thirty percent (30%) will be deducted for postlabs up to one week late. **No credit is given for postlab reports more than one week late. No credits are given to late prelabs.**
- **If under special circumstances you cannot attend the lab as scheduled, please talk to your TA as early as possible.** Lab make-ups are only given to students with valid excuses for missing a lab session with prior and proper notification of the TA.

TEXTBOOK

There is no required text for ME 4231.

TENTATIVE COURSE SCHEDULE

Week	Dates	Topic of the lecture	Lab session
1	Sep 8 – Sep 11	Introduction to C, Number systems, Introduction to Matlab	No Lab Sessions
2	Sep 14 – Sep 18	Programming in C: Loops, Arrays, Functions, Numerical Simulation	Lab 1: Representation of Numbers and Introduction to C
3	Sep 21 – Sep 25	Programming in C: Pointers, Bitwise Operations and More	Lab 2: C Programming: Loops, Arrays, Functions
4	Sep 28 – Oct 2	Input/Output, Sampling Theorem and Discrete Time Systems	Lab 3: Pointers, Bitwise Operators and More
5	Oct 5 – Oct 9	Frequency Response Digital Filtering	Lab 4: A/D, D/A, and Sampling
6	Oct 12 – Oct 16	Servo Motor Dynamics System Identification	Lab 5: Digital filtering
7	Oct 19 – Oct 23	Bode Plots	Lab 6: Servomotor System Identification
8	Oct 26 – Oct 30	Closed-Loop Motor Control	Lab 6: (Continued)
9	Nov 2 – Nov 6	PID Control	Lab 7: Closed-Loop Position and Velocity Control
10	Nov 9 – Nov 13	Use of Matlab and Simulink as Tools for Control System Design	Lab 8: PID Control
11	Nov 16 – Nov 20	Control of a Wheeled Robot	Lab 9: Matlab and Simulink as Tools for Control System Design
12	Nov 23 – Nov 27	Thanksgiving holidays	Thanksgiving holidays
13	Nov 30 – Dec 4	Programmable Logic Controllers – I	Lab 10: Robot Control
14	Dec 7 – Dec 11	Programmable Logic Controllers - II	Lab 11: PLC – 1
15	Dec 14 – Dec 18	Special Topics, Question Session, & Course Evaluation	Lab 12: PLC – 2
16	Dec 18	Final exam. 10:30 am – 12:30 pm on Fri, Dec 18th	Lab Make-Ups by Appointment with TA