Physics 312 - Analog Electronics

Instructor:

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Office Hours: See information on-line at http://www.mnstate.edu/lindaas

Course Description:
This course provides a general overview of analog electronics (electrical engineering). The course will cover circuit analysis (DC and AC), explore semiconductor devices (diodes and transistors), analog electronics (operational amplifiers) and timer circuits.

Objectives:
Students will be able to

- Analyze DC and AC circuits using appropriate techniques such as Thévenin's and Norton's equivalent circuits.
- Understand the function and application of resistors, inductors, capacitors, transformers, diodes and transistors, operational amplifiers and other integrated circuits.
- Use digital multi meters and oscilloscopes.
- Design, build (solder) and explain electronics projects.

Texts and Supplies:

- **Practical Electronics For Inventors 3/E**, by Paul Scherz and Simon Monk, McGraw Hill (2013)
- Lab notebook/journal.

Useful References

- **Analog Electronics for Scientific Application**, by D. Barnaal, Waveland Press Inc., (1989)
- **Foundations of Electrical Engineering 2/E,** by J.R. Codgell, Prentice Hall (1996)
- **Basic Electronics for Scientists 3/E,** by James J. Brophy, McGraw Hill (1977)
- **Electric Circuits 5/E,** by James W. Nilsson and Susan A. Riedel, Addison Wesley (1996)
- **The Art of Electronics,** by Paul Horowitz and Winfield Hill, Cambridge Univ. Press (1980)

Prerequisites: You must have completed Physics 201/201L or Physics 161/161L or have the permission of instructor. Knowledge of Linear Algebra and Calculus is always helpful.

Structure and Activities: This course is laboratory based which means you will spend most of your time in the laboratory. This is essential since physics, especially electronics, is not something you read about but must do. Laboratory activities will give you insight into the various aspects of electronics that we will be covering. As an upper level course much of the learning will occur outside of class.

Class Schedule: Monday, Wednesday and Friday 10:00 to 10:50 am in Hagen 324

Course Web Site: **http://www.mnstate.edu/lindaas/phys312/index.html** and **D2L**

This course makes extensive use of the internet to distribute course materials (assignments, solutions, etc.). If you anticipate having difficulty accessing the internet, please see Dr. Lindaas as soon as possible.

Evaluation: Each component of the course counts as follows:

	Lab Work		Evaluations		
Assignments	Activities	Projects	Unit Exams	Lab Practicals	Final Exam
20%	20%	20%	12%	18%	10%

Grades will be assigned on the absolute scale below; plusses and minuses will be used for the top or bottom quarter of a bracket.

A	B	C	D	F
100-90%	89-80%	79-70%	69-55%	< 55%

- **Assignments**: Electronics problems will be assigned. You are encouraged to work in groups, but the write-ups must be your own. Assignments are always due at the start of class unless otherwise indicated.
- **Activities**: You will complete CBA labs on particular topics. Lab journals and summaries will be evaluated.
- **Projects**: You will be designing and building larger projects – utilizing concepts you have covered in lab.
- **Lab Practicals**: We will periodically check your ability to use equipment or demonstrate lab technique.
- **Exams**: Exams will consist of several questions similar to problems as well as questions based on your knowledge of activities. Partial credit will be given, but only if what you have written is logical and well organized. The final exam will be comprehensive.
- **Attendance**: Attendance at all class meetings is expected. You will be working in groups on many activities, so your absences hurt your classmates as much as they hurt you. It is also difficult to get started if you are late.
- **Universal Excuse Form:** Sometimes life happens. You must use a universal excuse form if you want to:
  - turn in late assignments or labs
  - arrange alternative test dates –preferably in advance!
  - petition to make up missed quizzes or exams.
- **Academic Honesty:** Your education is only as good as your integrity. If you have any questions as to what is acceptable behavior see the instructor or review the MSUM Student Academic Policy in the Student Handbook: http://www.mnstate.edu/sthandbook/ (under Student Policy Info).

Special Accommodations:
Minnesota State University Moorhead is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students who have disabilities to provide and/or arrange reasonable accommodations.

- If you have, or think you may have, a disability (e.g. mental health, attentional, learning, chronic health, sensory or physical) please contact the DRC at (218) 477-4318 (V) or (800)627.3529 or 711 (MRS/TTY) to schedule an appointment for an intake.

Additional information is available on the DRC website: http://www.mnstate.edu/disability/