

**VILLANOVA UNIVERSITY**  
**DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING**

**COURSE SYLLABUS**

- Course:** ECE 5255-01 Biomedical System Design
- Term:** Fall 2013
- Time:** TR:1:00pm-2:50pm, CEER 212
- Prerequisite:** Fund. of Electrical Engineering I (ECE 2052)  
Fund. Of Electrical Engineering I Lab (ECE 2053)
- Instructors:** Lunal Khuon, Ph.D.  
Office: T424  
Office Hours: TR 10:30am-11:30am & by appointment  
Phone: 610-519-4982  
E-Mail: [lunal.khuon@villanova.edu](mailto:lunal.khuon@villanova.edu)
- Professor Karl Zurn  
E-Mail : [karl.zurn@villanova.edu](mailto:karl.zurn@villanova.edu)
- Professor Jane B. Zurn  
E-Mail : [jane.zurn@villanova.edu](mailto:jane.zurn@villanova.edu)
- TA:** Mr. Sachin Namboodiri  
E-Mail: [snambood@villanova.edu](mailto:snambood@villanova.edu)
- Text:** No Required Text. Reading materials will be made available through online access.
- References:** J. G. Webster, Medical Instrumentation, Application and Design, 4<sup>th</sup> Ed., John Wiley & Sons, 2010. ISBN-13:978-0471-67600-3
- Course Description:** Hands-on system-level development of various biomedical instrumentations using off-the-shelf sensors, available electronics, and a graphical programming environment and data acquisition platform.
- Major Instruments to Investigate:
1. Electrocardiography
  2. Electrooculography
  3. Blood Pressure Measurement\*
  4. Brain Computer Interface\*
- \*Time permitting
- Course website:** Materials and announcements can be found online on Blackboard at <https://elearning.villanova.edu/>

<b>Grading:</b>	<b>Participation</b>	<b>10%</b>
	<b>Labs/Quizzes</b>	<b>90%</b>

<b>Lab Materials:</b>	Software:
	National Instruments (NI) LabVIEW
	NI Elvismx for MyDAQ and Elvis
	NI Biomedical Startup Kit
	LTSpice
	Hardware (major):
	National Instruments MyDAQ (\$195/\$895)
	Florida Research Instruments (FRI-2000-2)
	Jameco Breadboard, Tools
	Crash cart: R, L, C, and discrete ICs
	Special Cables: BNC, BNC adapters
	Sensors (Mainly electrodes)

**You are required to replace missing/lost lab hardware or provide for replacement costs in order to complete the course and receive a final grade (MyDAQ, FRI adapter, breadboards, tools, cables).**

### **LATE SUBMISSION POLICY**

All assignments are to be submitted at the **beginning** of class on the due date.

1. Late assignments can be submitted
  - a. Only in class and only at the beginning of class
  - b. **25% off total possible points per session late**
2. Late assignment will **NOT** be accepted after the solutions and/or graded returned assignments are made available.
3. Quizzes must be completed within assigned time period. Online quizzes **automatically expire** at end of allocated time. A saved but not submitted online quiz will receive no credit.

### **ATTENDANCE POLICY**

Students are expected to attend all sessions. Students who, whether excused or unexcused, are absent from class are responsible for obtaining any notes, materials, or assignments presented in class either from fellow classmates or by directly contacting me. Missed in-class activities can be made up under my discretion.

Except absence due to unforeseen illness, all other excused absences must be pre-arranged with me.

### TENTATIVE SCHEDULE

This is a tentative schedule of topics to be covered in this course. Although it may not be possible to cover all of the topics due to time constraints, you are still required to follow all of the readings.

Date	Lecture	Lab
8/27 8/29	Course Intro & Overview	Lab 1 LabVIEW/myDAQ
9/3 9/5	Intro Cardiovascular Physiology Heart as a Pump	Lab 1 Lab 1
9/10 9/12	Blood Pressure	Lab 1 Lab 2 Blood Pressure: Oscill. Method
9/17 9/19	Electrocardiogram Electrophysiology	Lab 2 Lab 2
9/24 9/26	Biopotential Amplifiers	Lab 3 Heart Rate: Electrocardiogram Lab 3
10/1 10/3	Notch Filter & Electrodes	Lab 3 Lab 3
10/8 10/10		Lab 3 Lab 3
10/15 10/17	Semester RECESS-NO CLASS Semester RECESS-NO CLASS	
10/22 10/24	Electrooculogram	Lab 4 Eye Movement: Electrooculogram Lab 4
10/29 10/31	Electroencephalogram/Brain Computer Interface	Lab 4 Lab 4
11/5 11/7		Lab 5 TBD-EEG/BCI Lab 5
11/12 11/14	Biomedical Signal Processing	Lab 5 Lab 5
11/19 11/21	FDA Good Manufacturing Practices	Lab 6 Physiological Database & Toolkits Lab 6
11/26 11/28	Thanksgiving RECESS-NO CLASS Thanksgiving RECESS-NO CLASS	
12/3 12/5	FDA Approval (Medical Device Act) Sensory Considerations in Biomedical Design	Lab 6 Lab 6
12/10 12/12	Friday schedule-NO CLASS TBD-Final day of class	
	TBD-FINAL EXAM WEEK	