Course Number and Title:	EEE 4531 Techniques for High Fidelity Signal Acquisition
Credit Hours:	3 credits: Lectures 3 Hours, Lab: 0
Current Academic Term:	Fall 2018
Office:	Room # IST-2097
Office Hours:	Hours: Tuesday and Thursday: 10:00-11:00 am, 3:00-5:00pm; Wednesday: 2:00-3:00 pm, or just stop by if not busy, or unavailable, contact the instructor for a mutually convenient time.
Office Phone:	Tel: (863)-874-8647
Email:	asargolzaei@floridapoly.edu
Class Meeting Day, Time & Location:	Tuesday and Thursday: 5:30– 6:45 pm. Room # IST-1017
Course Website:	Canvas
Official Catalog Course Description:	The course covers the concepts, planning, design, tools, and skills related to acquiring high quality signals. Methods include extracting signals from noise, designing measurement systems to minimize noise and disturbance effects, and identifying and ameliorating sources of noise. The course also investigates measurement error using statistical analysis and sensors dynamic models.
Prerequisite(s):	EEE 3304- Analog Electronics
Co-requisite:	EEL 4652 – Control Theory
Pre-Requisite Policy	• The pre-requisite(s) and co-requisite(s) of a course as indicated in the course catalog will be strictly enforced, without exception. • A student who completes a course without first completing its prerequisites will be required to retake the class regardless of the grade received for the course.
Gordon Rule:	NO
Required Texts:	1. Introduction to Instrumentation and Measurements, 2nd Edition by Robert B. Northrop, (ISBN-13: 978-0849337734, ISBN-10: 0849337739), 2005. 2. Class notes, technical papers and other materials will be made available to the students at the discretion of the instructor, 2017.
Instructional Materials"	PowerPoint slides and in class lectures
Equipment and Materials:	Students need to be familiar with PSPISE or MATLAB Simulink or MultiSim
Course Objectives:	At the end of this course, you should be able to: • Understand the fundamental principles of measurement and uncertainty. • Describe low-noise system designs and covers digital signal processing and interfaces. • Understand how measurement systems are designed, calibrated, characterized, and • analyzed. • Understand some of the specific sensor systems trade-offs that must be made in commercial and scientific measurement systems. • Knowledge about noise reduction techniques which can be used for high fidelity image and signal acquisition.

Course Learning Outcomes (CLOs):	#	After successfully completing the course with a grade of C (2.0/4.0) or better, the student should be able to do the following:	Learning level	ABET Criteria
	1.	Identify the mechanism and applications of measurement systems.	1	e
	2.	Describe the fundamentals aspects of instrumentation and measurement	2	e
	3.	Design a data acquisition system to collect sensor data to meet desired needs within realistic constraints such as economic, safety and manufacturability.	5	c, b
	4.	Determine measurement errors using statistical analysis and sensors dynamical model	3	a, c
	5.	Apply modern simulation tools such as MATLAB for implementing the image and signal noise reduction techniques	3	k

Attendance	Attendance - see also University Policy at https://floridapolytechnic.org/wp-content/uploads/FPU-5.0010AP-Student-Attendance.pdf *Course specific attendance requirement:* Students are expected to attend class. Students whose absences exceed 8 classes may be Administratively Withdrawn at the discretion of the instructor unless prior arrangement is made to accommodate special circumstances.
Grading Scale:	See also University Policy https://floridapolytechnic.org/wp-content/uploads/FPU-5.0071AP-Grading-Policy-10.20.15.pdf

		0	55	58	63	67	70	73	77	80	83	87	90
		F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A

Assignment/Evaluation Methods:	Grade items: Quizzes, assignments, and Final Exam throughout the semester after the completion of a specific topic area – see the schedule for more details.	Points
	Project	40
	Homework	20
	Exam 1	20
	Exam 2	20
	Total	100

Make-Up:	No makeup tests or quizzes, except in case of emergency, e.g. illness and accident. For makeup tests, medical certificate is required, and the instructor must be notified in advance of the test.
Final Grade Calculations	The CANVAS calculates and displays the final letter grade based on the weighting factors as listed under **Assignment/Evaluation Methods**
Academic Support Resources	**Library**: Students can access the Florida Polytechnic University Library through the student portal Pulse and Canvas, on and off campus. Students may direct questions to the Success Desk in the Commons or by email, library@floridapoly.edu. **ASC**: The Academic Success Center, located in the Commons and at ASC East, provides a range of services. Students may direct questions to success@floridapoly.edu.

University Policies	**Academic Integrity**: All students must commit to the highest ethical standards in completion of all academic pursuits and endeavors: Academic Integrity **Reasonable Accommodations**: Students who qualify for course or classroom adjustments under the Americans with Disabilities Act (ADA) must register with the Office of Disability Services: Request for Disability Services. **Accommodations for** Religious Observances, Practices and Beliefs **Title IX**: Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sexual misconduct, including discrimination based on sex or gender, harassment, stalking, sexual assault, sexual exploitation, or intimate partner violence. If you or someone you know needs assistance, you may speak to any university employee; however, they have an obligation to report the incident to the Title IX Coordinator, who will keep that information private to the greatest extent possible. If you want to speak to someone permitted to keep your disclosure confidential, seek assistance from the Florida Polytechnic University Ombudsman, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-412-2700 (24-hour hotline) or 863-412-2708 to schedule an appointment. If you or someone you know feels unsafe or may be in imminent danger, please call the Florida Polytechnic University Police Department 863-874-8472 or the local Police Department 911 immediately. For more information about policy, reporting options and resources at Florida Polytechnic University and the community, please visit the Title IX Website.
Topics to be covered	• Measurement Systems • Errors in Measurements • Sensors modeling • Analog Signal Conditioning • Noise and Coherent Interference in Measurements • System identification methods • Digital Interfaces in Measurement Systems • Image and signal noise reduction techniques
Expectations from Students	• Read the complete syllabus and the deadlines. • Submit assignments in the CANVAS by the due dates (normally one week after posting date) to avoid any grade penalty.
Tentative Dates and Schedule	• Final Exam is scheduled on the final exam week and is announced by the university. • Other importance dates will be posted in the CANVAS. Students need to check the CANVAS at least twice a week.
Exam policy	• Make sure to complete the assigned homework in order to do well in the exam. • No discussion is permitted during the exams. • Instructor is not compelled to give credit for something he cannot read or follow logically. • Cheating is considered as a serious offense. Students who are caught will receive the appropriate consequences.

Class policy	**Attendance:** Attendance in the course is **<u>mandatory</u>** and student is not allowed to miss any class during the semester. **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result at least a failing grade for the course. **Excused Absences:** Only emergency medical situations or extenuating circumstances are excused with proper documentation. After reviewing documentation, you are required to email a description of the excuse and absence dates as a written record to asargolzaei@floridapoly.edu. - Students are encouraged to ask questions and to discuss course topics with the instructor and with each other. **Any work submitted should display ID number and should be signed, as the students' own work, and that no unauthorized help was obtained.** - Cell phones, communicators, MP3 players, head sets are not allowed to be used in the class. **DO NOT** send assignments by email. - Instructor reserves right to change course materials, date, and schedules as necessary. These changed will be announced in the classroom and/or CANVAS.	
Expectations from The Faculty	- Assignment or Homework is always graded within 1 week of being turned in and solution will be posted by that time. - Exams are always graded and returned with 1 week of the examination date. - Response to any questions by e-mail or phone within 48 hours (expect Weekends, breaks, and holidays).	
Special Notes and instructions:	- All assignments must be turned-in on time. Late home works will **NOT** be accepted. - All reports must the submitted in PDF files at the CANVAS site unless otherwise stated. No-high resolution images of assignments. - DO NOT send assignments by e-mails. The CANVAS drop box is the only place to submit your assignments - All quizzes are open book and must be completed by the due dates. You will be able to view the Quiz answers on the following Thursday for a period of four (4) days only. - Last not the least, when you e-mail to the instructor, you must mention the course number in your note.	
Created by:	Dr. Arman Sargolzaei	08/17//2016
Last Modified:	Dr. Arman Sargolzaei	08/17//2018
Reviewed by:	Dr. Muhammad H Rashid	08/20/2018

TENTATIVE SCHEDULE

weeks	Date	Reading - Sections	Topics	Classes	Assignments
1.	Aug 22-26		Read course syllabus and familiarize with CANVAS.	1	
2.	Aug 27 –Sep 2	M1	Introduction to measurements	2	
3.	Sep 3 – 9	M2	Noise in measurements	2	
4.	Sep 10 – 16	M3	Measurement errors	2	1
5.	Sep 17 – 23	M4.1	Analog signal conditioning	2	
6.	Sep 24 – 30	M4.2	Analog signal conditioning	2	2
7.	Oct 1 - 7	M5	Digital filter design	2	
8.	Oct 8 – 14	M6	A/D design, D/A design Signal sampling	2	3
9.	Oct 15 – 21	M7.1	Measurements from high resistance sources	2	Exam 1
10.	Oct 22 – 28	M7.2	Midterm project report Measurements from high resistance sources	2	Midterm survey
11.	Oct 29 – Nov 4	M8	Sensors Dynamic model of sensors	2	
12.	Nov 5 – 11	M9.1	system identification	2	4
13.	Nov 12 – 18	M9.2	System identification	2	
14.	Nov 19 – 25	M10	Noise reduction techniques	1	5
15.	Nov 26– Dec 2	M11	Noise reduction techniques	2	6
16.	Dec 3 – 5		Project demonstrations	1	Project
17.	Dec 6 – 7	Reading Days		0	
	Dec 8 – 13	Take Home Exam	Exam 2	1	
			Total	30	

WITHTHDRWAL DATE WITHOUT ACADEMIC PENALTY DEADLINE (W ASSIGNED): NOVEMBER 19, 201