

## Syllabus for ESET 359

### Electronic Instrumentation

### Spring 2022

#### Course Information

Course Number: ESET359  
 Course Title: Electronic Instrumentation  
 Section: 501-512

Time:

<b>Lecture</b>			
501-505, 511, 512	Tuesdays and Thursdays	9:35am – 10:50am	
506-510	Tuesdays and Thursdays	11:10am – 12:25pm	
<b>Office hours</b>			
Dr. Kim	Tuesdays and Thursdays	12:30pm – 13:30pm; by appointment	
TAs	TBD	TBD; by appointment	
<b>Lab</b>			<b>TAs</b>
501	Mondays	08:00am – 10:30am	<b>Bing</b>
502	Mondays	11:00am – 01:30pm	<b>Bing</b>
503	Tuesdays	11:00am – 01:30pm	<b>Devon</b>
504	Wednesdays	08:00am – 10:30am	<b>Devon</b>
505	Thursday	11:00am – 01:30pm	<b>Devon</b>
506/511	Mondays	02:00pm – 04:30pm	<b>Devon</b>
507	Tuesdays	08:00am – 10:30am	<b>Stefan</b>
508/512	Wednesdays	02:00pm – 04:30pm	<b>Stefan</b>
509	Thursday	08:00am – 10:30am	<b>Stefan</b>
510	Fridays	08:00am – 10:30am	<b>Stefan</b>

Location: 501-505, 511, 512: FERM 303; 506-510: HECC 200; All labs: Thom 204

Credit Hours: 4

#### Instructor Details

Instructor: Dr. Jeonghee Kim  
 Office: Fermier 008A  
 Phone: 979-845-1459  
 E-Mail: jeonghee.kim@tamu.edu  
 Office Hours: T/TR 12:30pm – 13:30pm; by appointment

Teaching Assistant: Bing Jiang (jiangbing@tamu.edu), Devon Dollahon (daredevon@tamu.edu), Stefan J. Manoharan (stefjabez@tamu.edu)

#### Course Description

Fundamentals of controls, measurement systems, sensors, sampling theorem, analog to digital and digital to analog conversions; signal conditioning; bio-potentials and biomedical transducer characteristics; digital signal processing; computer-based data acquisition using graphical development environment; and digital communication protocols.

### Course Prerequisites

ESET 349, and 350, and ENGL 103 or ENGL 104, with C or better grades.

### Special Course Designation

*Core curriculum (CORE)*

*This course is a part of the "instrumentation/control" core of the ESET/MXET program.*

### Course Learning Outcomes

At the end of this course, students should be able to do the following things:

- 1) To apply sampling theorem and design anti-aliasing filters.
- 2) To select and analyze sensors for measurement systems.
- 3) To analyze and design signal conditioning circuits.
- 4) To design instrumentation system using LabVIEW.
- 5) To develop software for measurement and control systems.
- 6) To analyze and design UART communication protocol in LabVIEW.
- 7) To write a technical report.

### Textbook and/or Resource Materials

*Require Textbooks: None*

*Reference Textbooks:*

- *Introduction to Instrumentation and Measurements, R.B. Northrop, CRC Press*
- *J. Webster, Medical Instrumentation, 4th edition*

### Grading Policy

In this course, homework/Quiz, lab, three exams, a LabVIEW project (as a part of labs), a course project, attendance, and extra bonus will be used.

Exam 1	10
LabVIEW Exam	5
Exam 2	15
Final Exam	20
Homework	10
Labs	25
Final Project/Report	10 (upto 3)
Attendance	5
Individual Meeting	(0.5)
Research Participation	(0.5)
<b>Total</b>	<b>100 (+4)</b>

**A: 90%-100%, B: 80%-89.99%, C: 70%-79.99%, D: 60%-69.99%, F: <60%, incomplete Lab, or an F score in Lab.**

**Laboratory:**

*Check off:* Students must attend the lab in person. Students need to complete the lab during the lab time. The lab activities can be prepared before the lab starts. The lab guideline will be posted at CANVAS. Students should show their work to the instructor/TA, and the instructor/TA will grade your work. If the students cannot complete the lab during the lab time, then they can show up the TA office hours (will be posted) and can be checked off only during the week; before the next lab starts, called “grace period,” will receive 30% penalty. If the students do not complete the lab on time and/or during the grace period; yet complete the lab activities and checked off after the grace period, then the student will have 100% penalty; yet not failing the course. If the students have any incomplete lab activity (not checked off), then the students will automatically fail the course.

<https://canvas.tamu.edu>

*Late lab policy:* Students must attend, and show their works during the assigned lab sections. If the students show up within 5 minutes, there will be no penalty. If they are late in 5-15 minutes, there will be 10% penalty for the lab activity score. If the students are late in 15-30 minutes, there will be 30% penalty. If the students are late more than 30 minutes, there will be 50% penalty. If the students are absent any single lab without prior approval or University allowed excuses, then the students will fail the class.

**Lab Reports:**

*Report rule:* Lab reports 1-4 will be **INDIVIDUAL** reports and Lab report 5-9 will be **TEAM** reports. All lab reports are due at the beginning of the following lab unless stated otherwise by the instructor. The lab report will consist of a cover sheet and a two to three page write up. Documentation should be sufficient for a non-technical person to recreate your lab. The write up will be typed and consist of an objective, a summary of the procedure, an analysis and discussion of the results, a conclusion, and answers to any questions at the end of the lab guidelines. Hand-written reports will not be accepted. Computing resources are readily available for you to prepare these reports.

*Late lab reports:* Students require to show submit (including the questionnaire) the lab report on time. If the students are late in submission within 24 hours of the due date, called grace period, then there will be 30% of penalty. Any submission after the grace period, there will be 100% of penalty; yet you should complete the lab reports to not fail the course.

**Missing Lab/Incomplete Lab:**

**The lab is not optional. Missed labs will result in an ‘F’ in the class regardless of your total score. Also, a failing grade in the lab will result in an ‘F’ in the class.**

**Final Project/Report:**

The deadline of the final project/report is ***May 1, 2022, 11:59pm***. No late submission will be allowed (No grace period for the final project).

*Final project:* The final project is “(tentative) EMG Controlled game on the LabVIEW.” The student will complete the project as a team project (group of two), and the project build/connect two-channel of EMG circuits using the lab Kit (provided) and connect the EMG signals to the LabVIEW software via UART communication. There will be an assigned game for the project, and the control of the game will be the EMG signals. Students will collect/process the EMG signal and convert the signal for the cursor control. Students need to save/record the performance/completion of the project and submit through CANVAS.

*Final report:* Final report is a part of the final project. Final report is also an INDIVIDUAL assignment, and it should be at least 2 pages of IEEE proceeding template that includes at least 2 figures, 1 table, 4 references. The students need to follow the IEEE template guideline. The template and example template will be posted on CANVAS for references.

*Graded Class Participation – None.*

*Graded Attendance –* Attendance is mandatory. Each unexcused absence in each lecture will result in 0.25-point reduction in the final grade average, up to 5 points. Attendance will be checked by completing quizzes at the end of each class. Each unexcused absence in each lab will result in fail the course. Documentation must be provided for excused absences. See the [Student Rule 7](#) for more details.

*Grades for Stacked Course – None.*

*Grading Policy Changes – None.*

### Late Work Policy

	Grace period	After the grace period
Exams/LabVIEW exam	Late submission NOT allowed (Penalty: 100%)	
Final project/report	Late submission NOT allowed (Penalty: 100%)	
Lab activities	<u>Lab attendance</u>	
	Late show up:	absent: fail the course
	~ 5 minutes: Penalty 0%	
	6-15 minutes: Penalty 10%	
	16-30 minutes: Penalty 30%	
Lab activities check off	30+ minutes: Penalty 50%	
	before next lab start	Should submit not to fail the course
Lab report	24 hours	Should submit not to fail the course
Homework	24 hours	
Penalty	30%	100%

*The late work policy should define what constitutes late work (e.g., submitting a deliverable after the established deadline). Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy. (See Student Rule 7.)*

### Course Schedule

<b>Lecture</b>		
501-505, 511, 512	Tuesdays and Thursdays	9:35am – 10:50pm
506-512	Tuesdays and Thursdays	11:10am – 12:25pm

**Lab**

501	Mondays	08:00am – 10:30am
502	Mondays	11:00am – 01:30pm
503	Tuesdays	11:00am – 01:30pm
504	Wednesdays	08:00am – 10:30am
505	Thursday	11:00am – 01:30pm
506/511	Mondays	02:00pm – 04:30pm
507	Tuesdays	08:00am – 10:30am
508/512	Wednesdays	02:00pm – 04:30pm
509	Thursday	08:00am – 10:30am
510	Fridays	08:00am – 10:30am

**Other important dates**

- **Exam1:** Feb. 22, 2022, Thur., 9:35 – 10:50am (501-505, 511, 512); 11:10 – 12:25pm (506-510)
- **LabVIEW exam due:** Feb. 26, 2022, Fri. 11:59pm (released: Feb. 23, Wed.)
- **Exam2:** April 5, 2022, Tuesday, 9:35 – 10:50am (501-505, 511, 512); 11:10 – 12:25pm (506-510)
- **Final Exam: May 5, 2022, Thur., 12:30 – 2:00pm (501-505, 511, 512); 3:00 – 4:30pm (506-510)**
- **Lab Reports:** Before the next assigned lab starts (No Lab report for Lab0 and Lab10).
- **Final Project/Report:** May 1, 2022, Sun., 11:59pm
- **Homeworks:** Specified dates; usually assigned every other week. Homework questions will be posted a week before the deadline.

**Traditionally Delivered Course**

WEEK	TOPIC	LAB
1	Course Overview /Instrumentation System	[0] Lab overview
2	Unit, Measurement System, Errors	[1] LabVIEW overview
3	Electronics, AC Circuits	[2] LabVIEW SubVIs
4	OP Amps	[3] LabVIEW exercise
5	Signal Conditioning, Review	[4] LabVIEW Application
6	Exam 1, LabVIEW exam	No Lab
7	Signal Conditioning	[5] NIDAQ Analog Input
8	Signal Conditioning, Sampling	[6] NIDAQ Analog Input (Op-Amp)
9	Spring break	No Lab
10	DAC	[7] NIDAQ Analog Output
11	ADC, Review	[8] Digital IO (Motor control)
12	Exam2, EMGs	No Lab
13	Sensors	[9] EMG1
14	Digital Signal Processing	[10] Final project preparation
15	Digital Signal Processing, Review	Final project due date
16	Final Exam	

*Non-Traditionally Delivered Course – None.*

**Optional Course Information Items**

*Consider adding the following additional information items to the course syllabus when appropriate.*

*Technology Support* – An lab kit will be provided, and students are responsible for checking the lab kits and returning them. The students are required to prepare extra components as described in laboratory guideline (battery and extra jump wires), and also students need to download/install appropriate software and driver to properly perform the lab activities. Students also require to have a web camera for the online exam and other online activities. The exams will be submitted through the designated online method. Therefore, students need to prepare to create/convert pdf documents properly/timely.

*Learning Resources* – Lecture notes, recorded lectures, lab guidelines, and any supplementary information will be provided through online (CANVAS).

## University Policies

*This section outlines the university level policies that must be included in each course syllabus. The TAMU Faculty Senate established the wording of these policies.*

**NOTE:** Faculty members should not change the written statements. A faculty member may add separate paragraphs if additional information is needed.

### Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to [Student Rule 7](#) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

### Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to [Student Rule 7](#) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" ([Student Rule 7, Section 7.4.1](#)).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" ([Student Rule 7, Section 7.4.2](#)).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See [Student Rule 24](#).)

## Academic Integrity Statement and Policy

“An Aggie does not lie, cheat or steal, or tolerate those who do.”

“Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate one’s work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case” ([Section 20.1.2.3, Student Rule 20](#)).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at [aggiehonor.tamu.edu](http://aggiehonor.tamu.edu).

**NOTE:** Faculty associated with the main campus in College Station should use this Academic Integrity Statement and Policy. Faculty not on the main campus should use the appropriate language and location at their site.

## Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit [disability.tamu.edu](http://disability.tamu.edu). Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

**NOTE:** Faculty associated with the main campus in College Station should use this Americans with Disabilities Act Policy statement. Faculty not on the main campus should use the appropriate language and location at their site.

## Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see [University Rule 08.01.01.M1](#)):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University’s goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with [Counseling and Psychological Services](#) (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University’s [Title IX webpage](#).

**NOTE:** Faculty associated with the main campus in College Station should use this Title IX and Statement on Limits of Liability. Faculty not on the main campus should use the appropriate language and location at their site.

## Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student’s academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at [suicidepreventionlifeline.org](https://suicidepreventionlifeline.org).

## COVID-19 Temporary Amendment to Minimum Syllabus Requirements

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Fall 2020 as part of the university’s COVID-19 response.

### *Campus Safety Measures*

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Fall 2020 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely and should not participate in face-to-face instruction.**
- Face Coverings—[Face coverings](#) (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of



face coverings and additional guidance are provided in the [Face Covering policy](#) and [Frequently Asked Questions \(FAQ\)](#) available on the [Provost website](#).

- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must wear a face covering (or a face shield if they have an exemption letter). If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should report that student to the [Student Conduct office](#) for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students.

### *Personal Illness and Quarantine*

Students required to quarantine must participate in courses and course-related activities remotely and **must not attend face-to-face course activities**. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or illness that is too severe for the student to attend class qualify for an excused absence (See [Student Rule 7, Section 7.2.2](#).) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7. While Student Rule 7, Section 7.3.2.1, indicates a medical confirmation note from the student's medical provider is preferred, **for Fall 2020 only, students may use the Explanatory Statement for Absence from Class form in lieu of a medical confirmation. Students must submit the Explanatory Statement for Absence from Class within two business days after the last date of absence.**

### *Operational Details for Fall 2020 Courses*

For additional information, please review the [FAQ](#) on Fall 2020 courses at Texas A&M University.

### **College and Department Policies**

College and departmental units may establish their own policies and minimum syllabus requirements. As long as these policies and requirements do not contradict the university level requirements, colleges and departments can add them in this section.