



SYLLABUS
College of Computing and Software Engineering

Department of Information Technology

IT 7313: Physical IT Systems Security

Spring 2022

# Course Information

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Class meeting time: *Online (Online Section) / Wednesday 5:00 pm – 6:15pm (Hybrid Section)*

Modality and Location: *For Hybrid Section J157*

*Syllabus is posted in D2L*

# Instructor

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**Name**: Maria Valero de Clemente

**E-mail**: mvalero2@kennesaw.edu

**Office Location**: J-312

**Office Phone**: (470) 578-4552

**Office Hours**: Monday 3:00 – 5:00pm or by appointment

**Course Communication**:

* Email is the best way to reach the instructor. Please always email me directly to mvalero2@kennesaw.edu and not
* Students’ emails will be replied WITHIN 24 hours during the weekday. Weekend and holidays don’t apply.
* When email the instructor, put the course number in the subject line [IT7313] along with your own subject. Emails without proper subject line will not be replied.
* Avoid using personal email. Sensitive information (such as your grades) can ONLY be sent to KSU email account.

# Course Description

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**Prerequisites**: IT6823.

**Credit Hours:** 3

**Required Texts**: None.

**Course Description:**

The course introduces fundamental security issues in physical IT systems. Topics include but not limited to physical IT systems, secure architecture, container security, physical system security, emulating physical systems, SCADA security, defense mechanism for physical system, secure cloud integration with physical system, and emerging topics in physical IT system security.

**Technology Requirements:**

* This class uses D2L as hosting site. Run a system check to ensure your computer work with D2L. Check out UITS D2L training: <http://uits.kennesaw.edu/support/d2ltraining.php> .
* Internet Connection. A high-speed Internet connection such as DSL or cable Internet access is highly recommended. You may also use computer labs on campus to complete the coursework.

# Student Learning Outcomes

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By the end of this course, a student should be able to:

* Describe basic security concepts and threats within common physical IT systems such as IoT and mobile system.
* Describe secure physical IT system architecture, application, packaging and delivery.
* Apply containerization to secure physical systems with real devices and emulators.
* Analyze vulnerabilities within hardware, software, network and infrastructure in the physical IT systems with hands-on tools.
* Design defense mechanism and apply best practices to prevent attacks on the physical systems.

# Course Requirements and Assignment

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The requirements of this course are listed as follows

**Hands-on Labs**: There are 6 labs in this course. Lab 1 is related to get familiar with raspberry pi and Raspbian environment. Lab 2 will provide a hands-on experience with docker containers inside an IoT device. Lab 3 will help to understand the emulation of sensors in CORE emulator. Lab 4 will perform communication between IoT physical devices and the Cloud. Lab 6 will introduce smart physical devices environment as google home.

**Discussion**: There are 2 discussions on different topics of IT Physical Systems Security

**Quizzes**: There are 2 quizzes which mainly contain multiple choice questions related to the content of corresponding learning modules.

**Project**: There is 1 project that will be developed during the semester. The project is related to the utilization of a physical device or emulator to apply security measurements to overcome physical vulnerabilities.

**Checkmarks**: In several occasions, the instructor will require to do some activities (like installing some software on IoT devices) or check some extra materials. This checkmarks will be evaluated as well for a 10% of the grade.

Additional information. Lab 6 will provide hands-on experience with KALI and CANBUS emulator.

# Evaluation and Grading Policies

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# Weight Distribution

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| --- | --- |
| **Grading Item** | **Weight**  |
| Labs (6) | 40% |
| Discussion (2) | 5% |
| Quizzes (3) | 15% |
| Project | 30% |
| Checkmarks | 10% |
| **Total**  | **100%** |

## **Grading Scale:**

90% - 100% A

80% - 89% B

70% - 79% C

60% - 69% D

0% - 59% E

Grades will be rounded up if they are > or = .5 or above, for example, an 89.6 is an A, but 79.2 is a C.

# Course Policies

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# Course Attendance Policy

* For on campus/hybrid section, students are expected to come to each class on time. Stay during the whole class period.
* For both campus/hybrid and online section, students’ attendance is also measured by how often a student login in D2L course website, participation of online discussion, as well as on-time completion of homework.

# Grading Items Turnaround Time

* The grades for the quizzes and exams will be available 96 business hours after the due date
* The grades for labs/assignments/projects will be available in less than 1 week after the due date

# Assignments & Exam Policy

* All assignments **MUST** be submitted through D2L (<https://kennesaw.view.usg.edu/> ) course website by the deadline specified in course calendar. Email submission will **NOT** be accepted. Any assignment that is less or equal than 24 hours late is subject to 10% penalty. Any assignment that is less or equal than 48 hours late is subject to 20% penalty. Any assignment that is more than 48 hours late will **NOT** be accepted.
* All quizzes and exams MUST be completed on D2L website by the deadline specified in course calendar. The quizzes exams can’t be opened/submitted after the deadline.
* If you must miss an exam due to illness, you must e-mail or call the instructor before the scheduled time. Failure to notify the instructor prior to the scheduled time will produce an automatic zero for the exam. NO makeup test except for emergencies with proof (e.g. doctor’s slip).

**Student Responsibility**

For this class, you are expected to spend seven to eight hours each week on coursework:

* Check KSU email regularly;
* Login D2L course website frequently to access the course material (at least every other day);
* Follow the weekly study guide in the learning module;
* Study the assigned material such as virtual lectures, textbook chapters and the PowerPoint slides;
* Complete assigned quiz/assignment/discussion/project on time.
* On every Monday, you will be provided with the following materials:
	+ An overview of our contents, materials, and goals for this week (this is where you start from: all homework, quizzes, assignments will also be announced in this study guide);
	+ Assigned reading from textbooks and/or provided material;
	+ PowerPoint slides;
	+ Homework assignments, or lab, or quiz;
	+ A brief video lecture to walk you through the PPT slides;
* During each week, you should:
	+ Read the assigned sections of the textbook and/or provided materials;
	+ Digest the PowerPoint slides;
	+ Take online quiz if assigned;
	+ Finish homework assignments and submit it on time;

**Tips for Effective Online Learning**

For an online class, students can really enjoy the benefits of learning at you own pace and at the place of your choice. Below are some tips for effective online learning.

* *Check D2L course website frequently*. It’s recommended that students should login D2L course site **AT LEAST** every other day. Always be aware of current status of the course. Take advantage of the posted learning material such as recorded lectures.
* *Work with the instructor closely*. If you have any question, contact the instructor immediately. You can either email or text me and your message is guaranteed to be replied within 24 hours.
* *Start your work early*. If you can start a task early, don’t start late. Assuming you spend the same amount of time completing the task, starting later will be much more stressful than starting early. Never start until the last minute! You’ll have no turnaround time if you need help or something happens.
* *Keep up with the work*. Don’t fall behind. If you do, contact the instructor immediately for what you need to do. The instructor may also contact you if he is concerned. Respond to the instructor’s inquiry promptly.

**Class Communication Rules**

In any classroom setting there are communication rules in place that encourage students to respect others and their opinions. In an online environment, the do's and don'ts of online communication are referred to as **Netiquette**. As a student in my course you should:

* Be sensitive and reflective to what others are saying.
* **Avoid typing in all capitals** because it is difficult to read and is considered the electronic version of 'shouting'.
* Don't flame - These are outbursts of extreme emotion or opinion.
* Think before you hit the post (enter/reply) button. You can't take it back! Don't use offensive language.
* Use clear subject lines.
* Don't use abbreviations or acronyms unless the entire class knows them. Be forgiving. Anyone can make a mistake.
* Keep the dialog collegial and professional, humor is difficult to convey in an online environment.
* Always **assume good intent** and **respond accordingly**. If you are unsure of or annoyed by a message, wait 24 hours before responding.

# Course Schedule

The course schedule is tentative and is subject to change. Please use D2L course calendar as accurate due dates.

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| **Weeks** | **Date** | **Topic** | **Assignment** |
| Week 1 | *Jan 10 – Jan 16* | Overview of Physical IT systems | Discussion #1 |
| Week 2 | *Jan 17 – Jan 23* | Physical platforms and elements | Checkmark #1 |
| Week 3 | *Jan 24 – Jan 30* | Principles of secure architectureTerm Project Overview | Lab 1: Raspberry Pi environment |
| Week 4 | *Jan 31 – Feb 6* | Containers and Dockers  | Quiz #1Checkmark #2 |
| Week 5 | *Feb 7 – Feb 13* | Containers security in physical systems | Lab 2: Containers inside Raspberry PiProject selection Approval |
| Week 6 | *Feb 14 – Feb 20* | Security issues in physical systems (sensor, actuators, hardware) – session hijacking, social engineering  | Quiz#2 |
| Week 7 | *Feb 21 – Feb 27* | Emulating a physical system | Lab 3: Emulating sensors in CORE |
| Week 8 | *Feb 28 – Mar 6* | Emulating a physical system, SCADA security | Term project initial report |
|  | *Mar 7 – Mar 13* | SPRING BREAK |  |
| Week 9 | *Mar 14 – Mar 20* | Defense mechanism for physical IT system – Design Secure DMZ, secure firewall, IDS | Discussion #2 |
| Week 10 | *Mar 21 – Mar 27* | Cloud Integration with physical systems | Quiz #3 |
| Week 11 | *Mar 28 – Apr 3* | Cloud Integration with physical systems – Sensors data collection and cloud communication | Lab 4: Raspberry Pi/Emulator and Cloud communication |
| Week 12 | *Apr 4 – Apr 10* | Autonomous Vehicle Overview, design of vehicle system | Lab 5: Kali intro and CANBUS protocol emulator |
| Week 13 | *Apr 11 – Apr 17* | Autonomous Vehicle Safety Guidelines, Requirement, CAN BUS introduction | Term project progress report |
| Week 14 | *Apr 18 – Apr 24* | Smart home sensors. Introduction to Amazon Alexa and Google Home | Lab 6: Intro with google assistant |
| Week 15 | *Apr 25 – May 1* | Smart mobile/home devices safety guidelines |  |
|  | *May 2 – May 5* | Review | Final Project Due |

**Important Dates:**

January 10: First day of class

January 17: MLK holiday

March 15: Last day to withdraw without academic penalty

March 7 – March 13: Spring break

May 2: Last day of class

**Institutional Policies**

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* [Federal, BOR, & KSU Course Syllabus Policies](https://cia.kennesaw.edu/instructional-resources/syllabus-policy.php)
* [Academic Integrity Statement](http://scai.kennesaw.edu/codes.php)
	+ Examples of violation of academic integrity: 1) copy from others or from Internet; 2) allow others to copy your work; 3) use other’s help or help other in completing the quizzes or exams.
	+ The first violation of academic integrity, the student will immediately receive 0 for the associated grading item. For the 2nd violation, the student will receive a fail grade for this course.

**KSU Statements on COVID-19**

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**Course Delivery**

KSU may shift the method of course delivery at any time during the semester in compliance with University System of Georgia health and safety guidelines. In this case, alternate teaching modalities that may be adopted include hyflex, hybrid, synchronous online, or asynchronous online instruction.

**COVID-19 illness**

If you are feeling ill, please stay home and contact your health professional. In addition, please email your instructor to say you are missing class due to illness. Signs of COVID-19 illness include, but are not limited to, the following:

* Cough
* Fever of 100.4 or higher
* Runny nose or new sinus congestion
* Shortness of breath or difficulty breathing
* Chills
* Sore Throat
* New loss of taste and/or smell

COVID-19 vaccines are a critical tool in “Protecting the Nest.” If you have not already, you are strongly encouraged to get vaccinated immediately to advance the health and safety of our campus community. As an enrolled KSU student, you are eligible to receive the vaccine on campus. Please call (470) 578-6644 to schedule your vaccination appointment or you may walk into one of our student health clinics.

For more information regarding COVID-19 (including testing, vaccines, extended illness procedures and accommodations), see KSU’s official [Covid-19 website](https://www.kennesaw.edu/coronavirus/).

**Face Coverings**

Based on guidance from the University System of Georgia (USG), all vaccinated and unvaccinated individuals are encouraged to wear a face covering while inside campus facilities. Unvaccinated individuals are also strongly encouraged to continue to socially distance while inside campus facilities, when possible.

# Student Resources

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This link contains information on help and resources available to students: [KSU Student Resources for Course Syllabus](https://curriculum.kennesaw.edu/resources/ksu_student_resources_for_course_syllabus.php)