Security for Safety Critical Systems
(Online)
Essential Information
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Preamble
Due to the COVID-19 situation, we have revised our teaching arrangements for the SESA module. The teaching will now consist of pre-recorded lectures (that will be published on the VLE1) and ‘live’ catch-ups and exercises (conducted over Zoom), which will be spread over two weeks (Weeks 2 & 3 in the schedule below). The open assessment will be released on the Thursday of the third week of teaching on the 14th May 2020, and the submission deadline will be 12:00 noon 15th July 2020.

We appreciate that attendees will have childcare, work and other commitments in this period of time so all the pre-recorded materials will be published a week in advance (in “Week 1” of the course) to provide some flexibility. We also understand that some attendees may not be able to attend ‘live’ sessions. Although we ask you to attend all sessions that you can, sessions will be recorded and published on the VLE to enable you to review them later.

Key Dates
• Module start date: 27th April 2020
• Predelivery facility test and Q&A: 11:00am2 and 4:00pm, 1st May 2020
• First live session: 4:00pm, 4th May 2020
• Assessment handout: 4:00pm, 14th May 2020
• Final wash-up and assessment Q&A live session: 4:00pm, 21st May 2020
• Assessment submission deadline: 12:00 noon 15th July 2020
• Feedback and mark due: 12:00 noon 12th Aug 2020

Contact Detail
Lecturing Team
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Administration Team
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1 Virtual Learning Environment: https://vle.york.ac.uk
2 All times in this document are UK summertime, GMT+1
Learning Instruction

This online module will start on the 27th of April. The learning activities are:

- **Week 1**: self-study on module material
- **Week 2&3**: review of materials and live exercise
- **Week 4 onward**: complete assessment

Module material are provided in at the beginning of Week 1 in the form of pre-recorded lectures. During Week 1, you are advised to watch as many of these as possible to ensure that you are ready before live wash-up sessions and exercises that would take place in Week 2 & 3. In Week 2 & 3, prior to a live session, you should review the relevant sessions to familiarise yourself with the material and note down any questions you may have to discuss in the live wash-up session allocated on the day. There are three sessions (including exercise where relevant) at maximum for you to review each day. Detailed timetable is provided in the next section.

All live sessions will be recorded subject to consents given by all participants. If you are unable to attend a live session, you can review the session at a different time if the session is recorded. Some of the live sessions will be repeated on the same day to offer you flexibility. You only need to attend one of these.

There are total of five exercise. These exercises are either in the form of

- **individual homework**: you need to complete the exercise on your own before the live wash-up session.
- **group exercise**: you will join a live online meeting and conduct the exercise with your group members.

Assessment will be available to you on the Thursday of Week 4. You will have the following week to go through the assessment and ask any question you may have on the Thursday of Week 4 during the live wash-up session.

Any questions you may have during the module, please either approach to the lecturers via email, during one of the live sessions, and/or post them on the VLE SESA Module Q&A Forum. We recommend that you use any opportunities you have to engage with the lecturers online or offline.
Timetable

Pre-teaching Weeks
Week 1 (27th Apr – 1st May)
Students are given all pre-recorded lecture materials and can view them at any time before the teaching weeks starts.

Friday
Live Session (11am-12am, repeated at 4pm-5pm): Test Online Facility & Pre-delivery Q&A

Teaching Weeks
Week 2 (4th May – 8th May)
Monday
Session 1: Introduction
Session 2: Safety vs Security

Exercise 1: Security Threats (Individual Homework)

Live Session (4pm-5pm): Day 1 Material Wash-up

Tuesday
Session 3: Introduction to Computer Security
Session 4: Attacks and Attack Models
Session 5: Attacks on IoT

Live Session (4pm-5pm): Day 2 Material Wash-up

Wednesday
Exercise 2: Printers (Individual Homework)

Live Session (11am-12am, repeated at 4pm-5pm): Day 3 Material Wash-up

Thursday
Session 6: Intro to Cryptology
Session 7: Symmetric Cryptography
Session 8: Asymmetric Cryptography

Live Session (4pm-5pm): Day 4 Material Wash-up

Friday
Session 9: Transport Layer Security

Exercise 3: TLS Evaluation (Individual Homework)

Live Session (4pm-5pm): Day 5 Material Wash-up
**Week 3 (11th May – 15th May)**

**Monday**
Session 10: Security Engineering Process
Session 11: Security Risk Analysis I

Live Session (4pm-5pm): Day 6 Material Wash-up

**Tuesday**
Session 12: Security Risk Analysis II
Session 13: Security Risk Analysis III

Live Session (4pm-5pm): Day 7 Material Wash-up

**Wednesday**

*Exercise 4: Security Risk Analysis (Individual Homework)*

Live Session (10am-12am, repeated at 4pm-6pm): Day 8 Material Wash-up

**Thursday**
Session 14: System Security I
Session 15: System Security II
Session 16: Secure Coding

Live Session (4pm-5pm): Day 9 Material Wash-up

Assessment accessible (4pm)

**Friday**
Session 17: Assurance Case

Live Session (10am-12am):
*Exercise 5: AGV Assurance Case (Group Activity)*

Live Session (4pm-6pm):
Session 18: Integrated Solutions

**Post-Teaching Weeks**

**Week 4 (21st May)**

**Thursday**

Live Session (11am-12am, repeated at 4pm-5pm): Module Wash-up & Assessment
Q&A
Facility Setup

Primary Facilities
The following primary facilities are required for this module.

VLE
Pre-recorded lectures are accessed via your VLE, in the module page, Security for Safety Critical Systems. To access this page, login to the VLE site via https://vle.york.ac.uk using your University account credentials. Once logged in, on the left-hand-side, you will see a “Module List”. In this list, you should see “Security for Safety Critical Systems (SESA) – 2019/20” under “Courses where you are: Student”. Click on the module title will direct you to the module site. On the module site, there is a navigation panel for you to find all module materials. For example, the pre-recorded lectures can be accessed via the page “Recorded Lectures”.

Zoom
All live sessions will be organised using Zoom. You will receive Zoom conference invitations for all of the live sessions. For how to setup Zoom, especially if you plan to install a desktop application, please visit https://www.york.ac.uk/it-services/services/zoom/

You will need to use your university login details when signing in Zoom.

Backup Facilities
In the unfortunate scenario where primary facility fails to support the delivery of the modules, we will use the following means to support your learning activities.

Google Hangout Meet
This will be used to replace Zoom when necessary. You will receive temporary Google Hangout Meet invitations to your university Gmail email account.

Google Jamboard
This will be used to replace the whiteboard functionality of Zoom. You will receive a Jamboard link in your university Gmail email account, and will be able to access to shared whiteboard.
Additional Resources

There is no fixed reading list for this module. However, if you would like to do some extra preparation for the course you may wish to consider the following:

- **Listen to Episode 27 of the DisasterCast podcast:**
  This episode covers interconnections between Safety and Security. We generally recommend DisasterCast as an excellent ‘easy listen’ safety podcast series created by our former colleague Dr Drew Rae. So, exploring other episodes is always a good idea!

- **Have a look at this Chatham House report into the Cyber Security at Civil Nuclear Facilities:**

- **Read around the topics of security engineering, network security and cryptography.**
  Any introductory texts / online resources or even wikipedia articles would be reasonable. This course is a gentle introduction to security in safety engineering context and assumes no pre-existing security knowledge.

- **Read the paper, “A survey of approaches combining safety and security for industrial control systems”, by Kriaa, et. al., downloadable at:**
  This highlights safety and security interdependencies for modern industrial systems and provide a comprehensive survey approaches that combines safety and security engineering.

- **Have a look at this summary of Industrial Control System Cyber Incidents:**

You can also listen to a couple of the introductory lectures once they are made available on the VLE and look deeper into the incidents or issues we cite.
FAQ

1. I am not in the UK and my access to internet is restricted.
You can still access all relevant materials by using a VPN, such as that provided by the University. For detail of how to set up the VPN using your University Account, please see https://www.york.ac.uk/it-services/services/vpn/

2. My work laptop doesn't allow the installation of new programmes and plug-ins (e.g. for Zoom, Google hangouts).
A Tablet should be sufficient. We acknowledge that different programmes will work for different people; and we apologise that this is the best we can do by sticking with technologies that are supported by the University. Recordings of live sessions will be available to you as downloadable videos. Please let us know as soon as possible, if you have encountered any problem with the technologies. If there are enough people in the same situation we may be able to use different programmes in different sessions.

3. I have very little time in Week 1.
We still strongly recommend you that you study as much as possible in Week 1. However, if you can only spend time working on the lectures steadily in Weeks 2 & 3 following the daily timetable, this will be just fine.

4. I will not be able to join in some of the live sessions/group activities.
We have provided alternative times for some of the group activities: please do attend the one that suits your time. If none of the options is feasible, the live sessions will be recorded for you to review at a different time.

5. I am concerned about discussions being recorded.
We will make sure that parts of the discussion will not be recorded. We will make it clear when the recording is started and when it ends. Recordings will only be made available to course attendees.
Let us know if you said something that in retrospect you felt you shouldn't have and we will try to edit the recording if we can. We ask attendees not to make a private recording of the exercises so that we can curate those as above.

6. I am unable to do the course.
We recognise that the circumstances have changed dramatically and that we have rescheduled the course.
- For fully registered (MSc/Dip/Cert) students - please contact your supervisor.
- For one-off / CPD students - please contact pgt admin at cs-pgt-admin@york.ac.uk

7. I will need more time to complete the assessment.
We recognise the difficult situation. A two-week blanket extension has been applied. If an extension beyond that period is required, you would need to file an Exceptional Circumstance (EC) claim. The University recognises that our standard evidence requirements may not be practicable during the COVID-19 outbreak. Details of the relevant guidance can be found at https://www.york.ac.uk/students/studying/progress/exceptional-circumstances/. Please email your supervisor or pgt admin at cs-pgt-admin@york.ac.uk in the first instance to discuss.

8. I am bored - is there anything extra I can do?
DisasterCast is a good 'easy listen' and covers a very broad range of safety
issues and accidents - we highly recommend it. Some additional reading is suggested above, and more will be put on the VLE once the module goes 'live'.