Launching into Cybersecurity – Units 4 through 6

This 12-week module comprises an introduction of the various core elements of the 2-year Master of Science in Cybersecurity program at University of Essex, Colchester England. Class of 2023. It intends to ensure a basic understanding of the primary skills that will be covered in greater detail during subsequent modules. It also provides insight and understanding of how the various specialties and occupational roles combine to provide a robust body of knowledge and skillset required to succeed in the field. While the student's final niche of practice may focus on only a few of the areas covered, it is beneficial to all who would master this critical field to gain a fuller understanding of the contribution and importance of all elements. As the units tend to build one up on another and contain summary review and reflection every few units, these journal entries will follow a similar track and cover three units in each.

This summary focuses on units 4-6 and the stated learning objects are:

- Develop solutions that will efficiently identify vulnerabilities and threats in software and over networks.
- Develop security requirement documents to ensure security is embedded in a software development process.
- Develop the capacity to predict security issues in software and develop appropriate solutions to deal with them.
- Develop the ability to apply concepts and principles of secure object-oriented analysis and design.
- Develop the knowledge and skills required for programming.
- Develop the ability to implement a security designed solution.
- Develop the ability to identify the software components and associated threats.
- Employ the UML modelling techniques to identify software dataflow, storage, and security issues.
- Apply the knowledge and skills to other security issues in software development.

Initial, Pre-unit Baseline

While prior experience is strong in high-level governance and risk assessment, my baseline with secure software development is practically non-existent. It has been many years since I wrote code beyond simple bash scripts required for pen-testing. A reading of the syllabus is daunting.

Progressive Learning Experience.

This emersion in secure object-oriented analysis and design, has been new territory. I have learned the basics of designing secure databases and how to perform pre-coding modeling of use cases and abuse cases using Universal Modeling Language (UML). The reading assignments required a first pass at speed to get the overview and interdependencies. This was followed by a more concise re-read with note taking and additional external reading to build a full understanding.

Unit 6 wrapped up with an "outline" for a technical report on the security issues, risks and potential controls involved in developing a secure web-based appointment scheduling system for a large medical center. The report, due in unit 9 will include UML diagrams for both use and abuse cases, and recommend controls for each. This scenario will constitute the end of course project due in unit 12 which comprises a detailed description of one of the issues identified in this essay and applies a custom control via original python code.

Personal Take-Away for Units 4-6

Again, the collaborative discussions and critical analysis of peer cohorts was valuable in expanding viewpoints and critical analysis of one's own work.

Essential Reading

Howard M. and LeBlanc. D. (2003). *Writing Secure Code*. 2nd ed. Microsoft Press.

Ambler, S. W. (2003) *The Elements of UML Style*. Cambridge, UK: Cambridge University Press.

Ambler, S. W. (2003) *The Elements of UML Style*. Cambridge, UK: Cambridge University Press

Additional Reading

Anderson, R. (2008) *Security Engineering: A Guide to Building Dependable Distributed Systems*. 2nd ed. Wiley.

Damodaran, M. (2006) Secure software development using use cases and misuse cases. *Issues in Information Systems* 7(1): 150-154.

Khan, R., McLaughlin, K., Laverty, D. & Sezer, S. (2017) *STRIDE-based threat modelling for cyber-physical systems*. IEEE PES Innovative Smart Grid Technologies Conference Europe (ISGT-Europe), Torino.1-6.

Vazquez, F. (2019) *Graph Databases. What's the Big Deal.* Towards data science.

van Rossum, G., Warsaw, B. & Coghlan, N. (2013) *Python Developer's Guide.*