Syllabus: Course INFSYS 3868/6868

Secure Software Development

About this course:

Required Texts:

There is no required text-book

Considerable material in the form of notes, videos, PowerPoint slides, and web links will be assigned and available through Canvas.

Optional Books:

If interested, check out the books below:


Course Description and Details

Bulletin Description:

INFSYS 3868 Secure Software Development: 3 semester hours

Prerequisites: A first course in programming such as INFSYS 3806 (Links to an external site.) or CMP SCI 2250 (Links to an external site.) or consent of instructor.

This course covers the concepts of software assurance and the fundamentals of the secure software lifecycle as it relates to software development. Students will experience the secure software lifecycle process by developing concrete artifacts and practicing in a lab environment. Credit cannot be granted for both INFSYS 3868 (Links to an external site.) and INFSYS 6868 (Links to an external site.).

INFSYS 6868 Software Assurance: 3 semester hours

Prerequisites: INFSYS 6805 (Links to an external site.) or INFSYS 6806 (Links to an external site.) or consent of Instructor.

This course provides an overview of the vast field of software assurance. The goal is to make students aware of the fundamentals of the secure software lifecycle enabling them to apply principles of secure software development and management. The course also provides practical applications that allow the learners to experience the secure software lifecycle process by developing concrete artifacts. Credit
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cannot be granted for both INFSYS 6868 (Links to an external site.) and INFSYS 3868 (Links to an external site.).

ACCTNG 5468 Accounting Software Assurance: 3 semester hours

Prerequisites: INFSYS 6805 (Links to an external site.) or INFSYS 6806 (Links to an external site.) or permission of instructor.

This course provides an overview of the vast field of software assurance. The goal is to make students aware of the fundamentals of the secure software lifecycle enabling them to apply principles of secure software development and management. The course also provides practical applications that allow the learners to experience the secure software lifecycle process by developing concrete artifacts. Credit can only be granted for one of INFSYS 3868 (Links to an external site.), INFSYS 6868 (Links to an external site.), and ACCTNG 5468 (Links to an external site.).

Student background:

This is a course on software security and is a required course for cybersecurity majors. A background in programming is required. A background in basic concepts of cybersecurity is preferred but not required. However, the course does get technical and I encourage you to get in touch with me if you have any concerns. It will also be helpful if students have their own desktop or laptop computers with at least 8GB of RAM (the more the better).

Motivation:

Cybersecurity can be studied and practiced and different levels of granularity. Typically, from the lowest to the highest level of granularity, you can consider:

- Data security (Cryptography)
- Software security (Vulnerabilities, Secure design and development)
- System security (Operating systems, Database systems, Network systems)
- Organization security (Policies, Standards, Compliance, Governance)
- Societal security (Ethics, Laws, Human factors)

In this course, we will focus at the second level of granularity, i.e., software security, in the above list.

Broad Learning Outcomes:

Upon completion of the course, students will be able to:

1. Understand properties of secure software
2. Compare severity of software vulnerabilities based on CVSS score
3. Understand the root causes of software vulnerabilities
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4. Identify a software vulnerability as design, implementation, or environmental
5. Identify and prioritize software security requirements
6. Understand different phases of security enhanced software lifecycle models
7. Perform gap analysis using BSIMM and OpenSAMM models
8. Identify relevant secure coding standards
9. Identify static analysis tools for application security testing
10. Understand different types of web application vulnerabilities
11. Understand different types of fuzzing techniques for black box security testing of software

Course Topics:

The following topics and sub-topics will be covered:

- Introduction
  - Software assurance definition
  - Properties of secure software
- Software vulnerabilities
  - Zero days
  - Design, Implementation, and Environment vulnerabilities
  - CVE, CVSS, NVD
  - Causes of vulnerabilities
  - Seven pernicious kingdoms
- Security in the software lifecycle
  - SDLC models
  - Maturity models
  - BSIMM
  - OpenSAMM
  - NIST SSDF
- Software security requirements
  - SQUARE model
  - Case study
- Web vulnerabilities
  - OWASP top 10
  - Cross site scripting (XSS)
  - Cross site request forgery (XSRF)
  - Command Injection
  - SQL Injection
- Code reviews
  - Static analysis
  - Defensive coding
  - Secure coding standards
- Software security testing
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- Fuzzing

How to Succeed in This Course

This online course is divided into "modules". Each module will have reading material, lecture videos, lecture slides, and assignments. The assignments will either be in the form of a quiz, discussion, programming assignment, or a written assignment you upload to Canvas.

- Each module is designed to be completed in two weeks. It is best that you pace yourself and try to complete the modules within that time.
- If this course were offered on campus, you’d be in class 2.5 hours/week plus travel time. The online version is no different in terms of expectations for your involvement. This is an active online course that requires 3 hours of your time each week in addition to the time it takes you to read the required materials, watch the videos, and complete the assignments. That means that you need to plan to spend a minimum of 6 hours every week (up to 9-10 hours a week) on activities related to this course. If you are worried about your preparedness, consider taking the Online Readiness Survey (Links to an external site.) to help decide if an online course is right for you.
- If something is not clear please contact the instructor.
- If this is your first online course, I recommend you complete the Online Course Overview listed in your Canvas course list. If you’ve already completed the orientation, you do not have to retake it but you can refer to it for helpful videos and tutorials about the technologies used in this course.

Assessment/Grading

Grading Components:

Students are expected to demonstrate learning by participating in discussions, completing assignments, and taking quizzes. There will be one final comprehensive exam. In addition to these, graduate students are required to work on individual term papers. Thus, your grade will be calculated as follows:

<table>
<thead>
<tr>
<th>Course Component</th>
<th>Weight - Undergraduate Students</th>
<th>Weight - Graduate Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz/Assignment</td>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>30%</td>
<td>15%</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Course Component</th>
<th>Weight - Undergraduate Students</th>
<th>Weight - Graduate Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Research Papers (Graduate Students only)</td>
<td>n/a</td>
<td>15%</td>
</tr>
<tr>
<td>Discussion and Engagement</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Maximum Possible Final Score:</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Grading Scale:

Letter grades will not be assigned to individual components of the course. Only points (numeric scores) will be assigned. These scores will be combined into a Final Score (a Weighted Total) out of 100, rounded to one decimal place. Depending on this final score, your overall letter grade for this course will be determined as follows.

<table>
<thead>
<tr>
<th>Final score ranges and corresponding letter grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;=94</td>
</tr>
<tr>
<td>90-93.9</td>
</tr>
<tr>
<td>86-89.9</td>
</tr>
<tr>
<td>82-85.9</td>
</tr>
<tr>
<td>78-81.9</td>
</tr>
<tr>
<td>74-77.9</td>
</tr>
</tbody>
</table>

Grading Scale: The UMSL Grading System is based on a four-point scale. The grade value for each letter grade (shown in table above) is available here: [http://bulletin.umsl.edu/undergraduatesudy/#gradingtext](http://bulletin.umsl.edu/undergraduatesudy/#gradingtext). At the same link, please also see the policies for, EX = Excused, DL = Delayed, and FN = Failure/Non Participation grade assignments.

Feedback and Grading Timeline:

Most quizzes should provide immediate feedback and scores. You can find your scores from the Grades button in this course on Canvas. Other assignments may take longer to grade but I will make every attempt to return scores within 10 days of assignment due date. If there is a rubric attached to the assignment, you can click your score to see my personal feedback on the rubric.
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Course Policies

Course Work:

1. I expect students to complete all readings and other work as per schedule.
2. Assignment/Quiz submission deadlines will be clearly stated. Late submissions will receive deductions of 10% for each 24 hour period after the due date until no points remain. I will consider exceptions only when a student has provided an acceptable reason (e.g., family/health emergency, unavoidable work related travel).
3. I will make announcements on Canvas. I strongly encourage you to visit this course under Canvas regularly for important updates and documents.
4. Please check your UMSL email account regularly for information/updates regarding this course.

Academic Integrity/Plagiarism

- You are responsible for being attentive to and observant of University policies about academic honesty as stated in the University’s Campus Policies and Code of Student Conduct found in the UMSL Bulletin
- Academic dishonesty is a serious offense that may lead to probation, suspension, or dismissal from the University. One form of academic dishonesty is plagiarism – the use of an author’s ideas, statements, or approaches without crediting the source. Academic dishonesty also includes such acts as cheating by using any unauthorized sources of information and providing or receiving unauthorized assistance on any form of academic work or engaging in any behavior specifically prohibited by the faculty member (e.g., copying someone else’s answers on tests and quizzes). Unauthorized possession or distribution of academic materials is another type of academic misconduct. It includes the unauthorized use, selling or purchasing of examinations or other academic work, using or stealing another student’s work, unauthorized entry or use of material in a computer file, and using information from or possessing exams that an instructor did not authorize for release to students. Falsification is any untruth, either verbal or written, in one’s academic work. Facilitation is knowingly assisting another to commit an act of academic misconduct. Plagiarism, cheating, and falsification are not acceptable.
- All instances of academic dishonesty will be reported to the Office of Academic Affairs who will determine whether you will appear before the Student Conduct Committee for possible administrative sanctions such as dismissal from the university. The instructor will make an academic judgment about the student’s grade on that work in this course. The campus process regarding academic dishonesty is described in the “Policies” section of the Academic Affairs website.
- Follow the AMA style for your reports.
- Plagiarism is the use of another person’s words or ideas without crediting that person.
- Plagiarism and cheating will not be tolerated and may lead to failure on an assignment, in the class, and dismissal from the University, per the UMSL academic dishonesty policy.
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- Students are responsible for being attentive to and observant of campus policies about academic honesty as stated in the University's Student Conduct Code.
- To avoid accusations of academic dishonesty, please submit all written work to the Turnitin System before finalizing what you submit for evaluation. Check information about The Writing Center on UMSL’s website.

Title IX Policies

In adherence to the policies of Title IX and to promote a safe and secure educational environment, it is strongly recommended statements similar to those below be added to your course syllabus:

- **Mandatory Reporting:** Under Title IX, all UMSL faculty, staff, and administrators (with limited exception) are obligated to report any incidents of sexual harassment, sexual misconduct, sexual assault, or gender discrimination to the Student Affairs office and/or other University officials. This ensures that all parties are protected from further abuses and that victim(s) are supported by trained counselors and professionals. Note: There are several offices at UMSL (e.g., Counseling Services, Health Services, Community Psychological Service, Center for Trauma Recovery, and Student Social Services) whose staff are exempt from Title IX mandated reporting, when the information is learned in the course of a confidential communication.

- **Content Advisory:** The course requires good logical skills and knowledge of materials from the pre-requisite courses. Some of the concepts require abstract thinking and ability of apply college level algebra.

Student Resources

**Access, Disability and Communication**

Your academic success is important. If you have a documented disability that may have an impact upon your work in this class, please contact Disability Access Services (DAS) immediately. Students must provide documentation of their disability to the office of Disability Access Services in order to receive official University services and accommodations. The staff is available to answer questions regarding accommodations or assist you in your pursuit of accommodations. Information about your disability is confidential. Once DAS reviews your medical documentation, they will provide you with the information and steps to inform me about the accommodations to which you are entitled. Your accommodations will begin as soon as we discuss your approved accommodations.

- 144 Millennium Student Center (MSC)
- Phone: (314) 516-6554
- Email: Tara Cramer, cramert@umsl.edu
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- **Website:** [http://www.umsl.edu/services/disability/](http://www.umsl.edu/services/disability/)

**Office of International Students and Scholar Services**
If you have difficulty communicating in English with the instructor of this course, contact ISS.

- 362 Social Sciences & Business Building (SSB)
- Phone: (314) 516-5229
- **Email:** iss@umsl.edu
- **Website:** [http://www.umsl.edu/~intelstu/contact.html](http://www.umsl.edu/~intelstu/contact.html)

**Student Enrichment and Achievement**
SEA provides comprehensive support and intervention strategies that support your road to graduation!

- 107 Lucas Hall
- Phone: (314) 516-5300
- **Email:** umslsea@umsl.edu
- **Website:** [https://www.umsl.edu/services/sea/](https://www.umsl.edu/services/sea/)

**Office of Multicultural Student Services (MSS) and the University Tutoring Center (UTC)**
MSS provides comprehensive student retention services to diverse student populations; through their tutoring center, the MSS offers comprehensive tutoring services free to students at UMSL.

- 225 Millennium Student Center (MSC)
- Phone: (314) 516-6807
- **Email:** multicultural@umsl.edu
- **Website:** [https://www.umsl.edu/~mcraa/index.html](https://www.umsl.edu/~mcraa/index.html)

More Student Resources are on the [Learning Resource Lab website](http://www.umsl.edu/services/disability/).

**Technical Support**

**Canvas**
If you have problems logging into your online course, or an issue within the course site, please contact the

**Technology Support Center:**

- Phone: (314) 516-6034
- **Email:** helpdesk@umsl.edu
- **Website:** [http://www.umsl.edu/technology/tsc/](http://www.umsl.edu/technology/tsc/)
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If you are having difficulty with a technology tool in Canvas, consider visiting the Canvas Student Guides, which has overviews of each tool and tutorials on how to use them.

If you continue to experience problems or just have questions, you can also contact the Learning Resource Lab:

- Phone: (314) 516-6704
- Email: lrl@umsl.edu
- Website: http://www.umsl.edu/technology/lrl/

VoiceThread

- Online Contact Form: https://voicethread.com/support/contact/
- Website: https://voicethread.com/howto/

Academic Support

Math Academic Center (Math Lab)
The Math Academic Center offers free individual assistance on a walk-in basis to students needing help with any mathematics from basic math through calculus or any course involving mathematical skills.

- 222 Social Sciences and Business Building (SSB)
- Website: http://www.umsl.edu/mathcs/math-academic-center/

Other Support Services:
A variety of academic, non-academic, and technical support services are available on campus. Please visit Student Resources (Links to an external site.) to get information.