University of South Florida
Muma College of Business
Information Systems and Decision Sciences
ISM 6124.020F23 - Advanced Information Systems

Instructor:	Alan R. Hevner	*E-Mail:*	ahevner@usf.edu
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Term:	Fall Semester 2023	*Dates:*	8/21/23-10/13/23
Delivery Method:	Online, Asynchronous	*Location:*	Off Campus / Online
Course Technical Prerequisites	*In order to take courses online at USF, you will need to be able to demonstrate proficiency at basic computer skills, maintain reliable internet access, and meet the computer system requirements listed at:* https://www.usf.edu/it/remote/requirements-for-students		
Virtual Office Hours via Teams:	Instructor – Wednesdays (8/23/23 to 10/11/23) from 5-6pm on Teams TA – By appointment		
Synchronous Sessions:	As needed by discretion of instructor or TA.		

I. Instructor Contact Information and Communication

The preferred method of instructor contact is via ahevner@usf.edu . You may address the instructor as Prof. Hevner.

II. First Week Attendance Policy

First week attendance will be taken via your participation in the Course Introductions discussion board in Canvas. Your comments on this discussion board will serve as evidence of first week attendance in the class. Please reply on this discussion board by noon of Wednesday during the first week of classes so the instructor can submit the attendance roster for the class. If you are not marked present in first week attendance you will be dropped from the class.

III. University Course Description

Software-intensive systems are the most interesting and challenging artifacts ever designed and developed by humans. Software has the capability to solve the most difficult problems accurately and efficiently. It is ubiquitous in all aspects of our lives. Future complex software-intensive systems will be vastly different from the systems that run today's world. Revolutionary advances in hardware, networking, information, and human interface technologies will require entirely new ways of thinking about how software-intensive systems are conceptualized, designed, built, and evaluated. Research and development must provide the foundations for managing issues of complexity, quality, cost, and human intellectual control of software-intensive systems.

IV. Course Purpose

The goal of this course is to instruct you in the technical and managerial foundations of software engineering and information systems development. Based on a prerequisite understanding of basic systems concepts, you will learn to manage and perform activities throughout the software-intensive systems development life cycle, from the analysis of system requirements through system design to system implementation, testing, and maintenance. The roles of creativity and analytics are highlighted throughout the software development processes. Issues of software security throughout the life cycle are highlighted. Current best practices in systems development are presented and research challenges are discussed.

V. Course Structure

This course is structured as eight weekly modules in Canvas. The content of each module is specified in the course Syllabus and weekly Canvas Modules. Assignments and grading criteria are provided in the Canvas assignments. Student discussion boards provide a weekly assessment of student understanding and progress.

VI. Course Objectives

Upon completion of this course, students will:

- Know the objectives of software engineering to produce and manage the operations of high quality software systems
- Understand the basic concepts and definitions used in the field of software engineering
- Understand how quality assurance activities are applied throughout the software development life cycle

VII. Student Learning Outcomes

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

- Apply agile and disciplined methods in the design of a software development life cycle process
- Determine functional and quality requirements of a system using rigorous requirements engineering techniques.
- Understand the different specification approaches for software development (e.g. model-driven specification, software architectures, formal specification)
- Design software systems using component-based development methods
- Design software systems using web services and service-oriented architectures
- Develop strategies for software testing using functional and structural testing methods
- Design secure software systems with the latest cybersecurity methods
- Understand and be able to apply the latest software engineering best practices in the areas of Cloud-based Computing, Systems Reengineering, Metrics, GreenIT Methods, and Human Computer Interactions
- Demonstrate proficiency with a state-of-the-art software Integrated Development Environment (IDE) (e.g. Gliffy)
- Understand the importance of creativity in the design and evaluation of software systems

VIII. Required Course Materials

- No Textbooks are required
- Gliffy provides an ICASE environment for software application development
    - https://www.gliffy.com/

IX. Recommended Texts

- Steve McConnell, **More Effective Agile: A Roadmap for Software Leaders**, Construx Press, 2019. An insightful presentation of the current state-of-the-art in Agile Methods.
- Barry Boehm and Richard Turner, **Balancing Agility and Discipline: A Guide for the Perplexed**, Addison-Wesley, Inc., 2004. This book provides a balanced presentation of the tradeoffs between disciplined software development methods and increasing popular agile methods.
- Fred Brooks, **The Mythical Man-Month**, Anniversary Edition, Addison-Wesley, Inc., 1995. A presentation of lessons learned during the development of the IBM System 360 systems. A classic of software engineering literature.
- Tom DeMarco and Tim Lister, **Peopleware: Productive Projects and Teams**, 2nd Edition, Dorsett House Publishing, 1999. – The classic book on people issues in software system development.
- Martin Fowler, **UML Distilled**, 3rd Edition, Addison-Wesley, Inc., 2003. A concise overview of UML representations and development methods.
- Roger Pressman and Bruce Maxim, **Software Engineering: A Practitioner's Approach**, 9th Ed., McGraw-Hill, 2019. A comprehensive textbook covering all software engineering topics.
- Ian Sommerville, **Software Engineering**, 10th Ed., Pearson, 2017. A comprehensive textbook covering all software engineering topics.
- C. Pfleeger, S. Pfleeger, and J. Margulies, **Security in Computing**, 5th Edition, Prentice-Hall, Inc., 2018.

X. Basis for Final Grade

The Plus/Minus grading system will be used in this course. Grading is on the curve and no set grading scale is used.

Class Participation	10%
Two Quizzes (Each 20%)	40%
ICASE Assignment	15%
AI Systems Report and Discussions	20%
Case Study Discussions and Reflection Report	15%

XI. **Semester Project – AI Systems Report**

This assignment will give each student an opportunity to investigate in depth the use of Artificial Intelligence (AI) for the development of software systems or to study a leading-edge AI business application software system. You will select a topic that is of particular interest to you based on instructor approval of your topic. The project requirements are detailed in the AI Systems assignment document found on Canvas.

XII. **Course Schedule***

Date (Week)	Topic	Readings

August 21
Module 1
	Introduction to Course
	- Course Materials
	  - *AI Systems Assignment*
	  - *Case Study Assignment*
	- Challenges for the Future in IS Development
	- Principles of Software Development
	- Software Engineering Responsibilities and Ethics
		1-2

August 28 Module 2	Software Development Processes and Methods – Definitions – Plan-Driven Processes – Agile Processes – DevOps – Control Mechanisms in Flexible Processes – Risk Management – The Right Process for Your Project	3-5

September 4
Module 3
	Software Development Life Cycle Activities
	– Cleanroom Principles
	– Requirements Activities
	  o Quality Attributes
	– Specification Activities
	  o Formal Specification Languages
	  o Model-Driven Specification (UML)
	  o Software Architectures
	– Design Activities
	  o Component Based Development (CBD)
	  o Web Services and Service-Oriented Architectures
	– Implementation and Coding
	– Testing Activities
	  o Inspections and Reviews
	  o Testing Strategies
		6-11

	Quiz 1 covers material from Modules 1-3 *Due: September 16 by end of day*	

September 11
Module 4
	Guest Lectures:
	- Managing People in Software Development
	  o Guest Speaker – Larry Gioia
	- The Practice of Software Development
	  o Guest Speaker – Rob Schaaf
		12
		Speaker Handouts

September 18 Module 5	Integrated Computer Aided Systems Engineering (ICASE) Software Development - Automated Tools for Software Development - Introduction to ICASE Tool - Gliffy *ICASE Assignment Due September 30 by end of day*	13
September 25 Module 6	Best Practices and Cutting Edge Directions in Software Development - Software Systems Security - Reengineering - Metrics - GreenIT - Human Computer Interactions - Cloud Computing - Internet of Things (IoT) Computing - Digital Platforms - Artificial Intelligence (AI)	14-21
	Quiz 2 covers material from Modules 4-6 *Due: October 7 by end of day*	
October 2 Module 7	AI Systems Report Discussions - *AI Systems Report Due October 2* - *AI Systems Discussion Board Comments from October 3 to October 13*	
October 9 Module 8	Course Wrap-up Case Study Discussions - *Final Reflection Reports Due October 13*	

Please refer to the Course Summary & Modules within Canvas for important deadlines and a listing of what topics will be covered.

* Course schedule and topics are subject to change.

XIII. **Readings**

The majority of readings will be downloads available on Canvas. Other readings will provide URL links to source websites. Students should review the material on the website and download material as needed for the class discussion. A few readings come from recommended texts. All readings are to be completed during the week assigned.

1. Scan Part I of "Ultra-Large-Scale Systems: The Software Challenges of the Future," from the Software Engineering Institute website https://resources.sei.cmu.edu/library/asset-view.cfm?assetid=30519

2. "ACM Code of Ethics and Professional Conduct" from ACM website https://www.acm.org/code-of-ethics from IEEE website https://www.computer.org/web/education/code-of-ethics

3. Readings from Steve McConnell, **More Effective Agile: A Roadmap for Software Leaders** and Barry Boehm and Richard Turner, **Balancing Agility and Discipline: A Guide for the Perplexed**.

4. Extreme Programming overview - http://extremeprogramming.org
Scrum overview - https://www.scrumalliance.org/agile-resources/overview-of-the-scrum-framework
5. M. Harris, A. Hevner, and R. Collins, "Controls in Flexible Software Development," *Communications of the Association for Information Systems*: Vol. 24, Article 43, 2009, pp. 757-776.
6. R. Linger, "Cleanroom Process Model," *IEEE Software*, Vol. 11, No. 3, March 1994.
7. C. LeRouge, A. Hevner, R. Collins, M. Garfield, and D. Law, "Telemedicine Encounter Quality: Comparing Patient and Provider Perspectives of a Socio-Technical System," *Proceedings of the 37th Annual Hawaii International Conference on System Sciences* (HICSS37), Hawaii, January 2004.
8. Y. Zheng and R. Taylor, "A Rationalization of Confusion, Challenges, and Techniques in Model-Based Software Development," ISR Tech Report #UCI-ISR-11-5, Univ. of Cal, Irvine, August 2011.
9. UML Resources:
    a. Martin Fowler, UML Distilled, 3rd Edition, Addison-Wesley, Inc., 2004.
    b. OMG Resources and Tutorials https://www.uml.org/resource-hub.htm
    c. LucidChart Tutorial https://www.lucidchart.com/pages/uml
10. P. Ford, "What is Code?" Bloomberg Business, June 11, 2015 Issue. http://www.bloomberg.com/graphics/2015-paul-ford-what-is-code/
11. J. Whittaker, "What Is Software Testing? And Why Is It So Hard?" *IEEE Software*, Vol. 17, No. 1, January/February 2000.
12. Readings from Tom DeMarco and Tim Lister, **Peopleware: Productive Projects and Teams**, 2nd Edition, Dorsett House Publishing, 1999.
13. Download the Gliffy ICASE System documents from Canvas.
14. J. Carroll, "The Evolution of Human-Computer Interaction," InformIT, Nov. 2001, at http://www.informit.com/articles/printerfriendly.aspx?p=24103 .
15. R. Watson, M. Boudreau, and A. Chen, "Information Systems and Environmentally Sustainable Development: Energy Informatics and New Directions for the IS Community, *MIS Quarterly*, 34(1), 2010.
16. G. McGraw, "Software Security," *IEEE Security & Privacy*, March/April 2004, pp. 80-83.
17. M. Armbrust et al., "Above the Clouds: A Berkeley View of Cloud Computing," Technical Report No. UCB/EECS-2009-28, https://www2.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.pdf, February 10, 2009.
18. Deloitte, "Inside the Internet of Things," Deloitte University Press, 2015.
19. R. Linger and A. Hevner, "Flow Semantics for Intellectual Control in IoT Systems, *Journal of Decision Systems*, 27:2, 2018, pp. 63-77.

20. W. Shi et al., “Edge Computing: Vision and Challenges,” *IEEE Internet of Things Journal* (3:5), October 2016.
21. A. Hevner and O. Malgonde, “Effectual Application Development on Digital Platforms,” *Electronic Markets*, 29(3), September 2019, pp. 407-421.

XIV. **Instructor Feedback Policy & Grade Dissemination**

Instructor will respond to email communication relevant to the subject matter within 12 hours of the time received. Instructor will provide feedback on assignments within one week of the posted deadline. You can access your scores at any time using "Grades" in Canvas.

XV. **Course Policies**

Attendance Policy: For an online course, attendance is not a factor in grading. Students are expected to take responsibility for full preparation and completion of all course requirements.

Incompletes: Only in rare cases, such as serious illness, will an Incomplete be given. An Incomplete must be requested in writing giving the reason for the request and all appropriate documentation. An Incomplete grade ("I") is exceptional and granted at the instructor’s discretion only when students are unable to complete course requirements due to illness or other circumstances beyond their control. The course instructor and student must complete and sign the "I" Grade Contract Form that describes the work to be completed, the date it is due, and the grade the student would earn factoring in a zero for all incomplete assignments. The due date can be negotiated and extended by student/instructor as long as it does not exceed two semesters for undergraduate courses and one semester for graduate courses from the original date grades were due for that course. An "I" grade not cleared within the two semesters for undergraduate courses and one semester for graduate courses (including summer semester) will revert to the grade noted on the contract.

Synchronous Sessions: At the discretion of the instructor or TA, synchronous virtual sessions on Teams may be held. During such sessions, software may be used to record live class lectures and discussions. As a student in this class, your participation in live class discussions will be recorded. These recordings will be made available only to students enrolled in the class, to assist those who cannot attend the live session or to serve as a resource for those who would like to review content that was presented. Students who prefer to participate via audio only will be allowed to disable their video camera so only audio will be captured. Please discuss this option with your instructor.

XVI. **USF Institutional Policies**

Academic Integrity: The following USF policies cover student responsibilities and rights. For a complete list of USF System Regulations and University Policies: See https://www.usf.edu/regulations-policies/ Relevant Policies include:

- **Academic Integrity of Students**
- **Disruption of the Academic Process**
- **Student Academic Grievance Procedures**

USF Policy on University Closure: In the event of an emergency, it may be necessary for USF to suspend normal operations. During this time, USF may opt to continue delivery of instruction through methods that include but are not limited to: Canvas, Teams, and email messaging and/or an alternate schedule. It's the responsibility of the student to monitor the Canvas site for course specific communication, and the main USF, College, and department websites, emails, and MoBull messages for important general information.

Title IX Policy: Title IX provides federal protections for discrimination based on sex, which includes discrimination based on pregnancy, sexual harassment, and interpersonal violence. In an effort to provide support and equal access, **USF has designated all faculty (TA, Adjunct, etc.) as Responsible Employees, who are required to report any disclosures of sexual harassment, sexual violence, relationship violence or stalking.** The Title IX Office makes every effort, when safe to do so, to reach out and provide resources and accommodations, and to discuss possible options for resolution. Anyone wishing to make a Title IX report or seeking accommodations may do so online, in person, via phone, or email to the Title IX Office. For information about Title IX or for a full list of resources please visit: https://www.usf.edu/title-ix/gethelp/resources.aspx. *If you are unsure what to do, please contact Victim Advocacy – a confidential resource that can review all your options – at 813-974-5756 or va@admin.usf.edu.*

Campus Free Expression: It is fundamental to the University of South Florida's mission to support an environment where divergent ideas, theories, and philosophies can be openly exchanged and critically evaluated. Consistent with these principles, this course may involve discussion of ideas that you find uncomfortable, disagreeable, or even offensive. In the instructional setting, ideas are intended to be presented in an objective manner and not as an endorsement of what you should personally believe. Objective means that the idea(s) presented can be tested by critical peer review and rigorous debate, and that the idea(s) is supported by credible research. Not all ideas can be supported by objective methods or criteria. Regardless, you may decide that certain ideas are worthy of your personal belief. In this course, however, you may be asked to engage with complex ideas and to demonstrate an understanding of the ideas. Understanding an idea does not mean that you are required to believe it or agree with it.

XVII. **Student Expectations**

Course Hero / Chegg Policy: The USF Policy on Academic Integrity specifies that students may not use websites that enable cheating, such as by uploading or downloading material for this purpose. This does apply specifically to Chegg.com and CourseHero.com – almost any use of these websites (including uploading proprietary materials) constitutes a violation of the academic integrity policy.

End of Semester Student Evaluations: All classes at USF make use of an online system for students to provide feedback to the University regarding the course. These surveys will be made available at the end of the semester, and the University will notify you by email when the response window opens. Your participation is highly encouraged and valued.

Turnitin.com: In this course, turnitin.com may be utilized. Turnitin is an automated system which instructors may use to quickly and easily compare each student's assignment with billions of web sites, as well as an enormous database of student papers that grows with each submission. Accordingly, you will be expected to submit all assignments in both hard copy and electronic format. After the assignment is processed, as instructor I receive a report from turnitin.com that states if and how another author's work was used in the assignment. For a more detailed look at this process visit http://www.turnitin.com. Essays are due at turnitin.com the same day as in class.

Netiquette Guidelines

1. Act professionally in the way you communicate. Treat your instructors and peers with respect, the same way you would do in a face-to-face environment. Respect other people's ideas and be constructive when explaining your views about points you may not agree with.
2. Be sensitive. Be respectful and sensitive when sharing your ideas and opinions. There will be people in your class with different linguistic backgrounds, political and religious beliefs or other general differences.
3. Proofread and check spelling. Doing this before sending an email or posting a thread on a discussion board will allow you to make sure your message is clear and thoughtful. Avoid the use of all capital letters, it can be perceived as if you are shouting, and it is more difficult to read.
4. Keep your communications focused and stay on topic. Complete your ideas before changing the subject. By keeping the message on focus you allow the readers to easily get your idea or answers they are looking for.
5. Be clear with your message. Avoid using humor or sarcasm. Since people can't see your expressions or hear your tone of voice, meaning can be misinterpreted.

Email and Discussion Board Guidelines:

1. Use the subject line effectively by using a meaningful line of what your email or discussion is about.
2. Keep your emails and postings related to the course content. You should not post anything personal on a discussion board, unless is requested by the instructor.
3. Any personal, course or confidential issues should be directly communicated to the instructor via email. The discussion boards are public spaces; therefore, any issues should not be posted there.

XVIII. Course Technology & Student Support

Academic Accommodations
Students with disabilities are responsible for registering with Student Accessibility Services (SAS) in order to receive academic accommodations. For additional information about academic accommodations and resources, you can visit the SAS website.
SAS website for the Tampa and Sarasota-Manatee campuses.
SAS website for the St. Pete campus.

Academic Support Services
The USF Office of Student Success coordinates and promotes university-wide efforts to enhance undergraduate and graduate student success. For a comprehensive list of academic support services available to all USF students, please visit the Office of Student Success website.

Canvas Technical Support
If you have technical difficulties in Canvas, you can find access to the Canvas guides and video resources in the "Canvas Help" page on the homepage of your Canvas course. You can also contact the help desk by calling 813-974-1222 in Tampa or emailing help@usf.edu.
IT website for the Tampa campus.
IT website for the St. Pete campus.
IT website for the Sarasota-Manatee campus.

Center for Victim Advocacy
The Center for Victim Advocacy empowers survivors of crime, violence, or abuse by promoting the restoration of decision making, by advocating for their rights, and by offering support and resources. Contact information is available online.

Counseling Center
The Counseling Center promotes the wellbeing of the campus community by providing culturally sensitive counseling, consultation, prevention, and training that enhances student academic and personal success. Contact information is available online.
Counseling Center website for the Tampa campus.
Counseling Center website for the St. Pete campus.
Counseling Center website for the Sarasota-Manatee campus.

Writing Studio
The Writing Studio is a free resource for USF undergraduate and graduate students. At the Writing Studio, a trained writing consultant will work individually with you, at any point in the writing process from brainstorming to editing. Appointments are recommended, but not required. For more information or to make an appointment, email writingstudio@usf.edu.
Writing studio website for the Tampa campus.
Writing studio website for the St. Pete campus.
Writing studio website for the Sarasota-Manatee campus.

XIX. **Important Dates to Remember**

University calendar dates are found at http://www.usf.edu/registrar/calendars/ .

All course dates are found on the course syllabus and in Canvas.