

**Dr. Kenneth E. Nidiffer**

**Successfully Managing and Leading Software Projects  
Software Engineering 625**

**Volgenau School of Information Technology and Engineering  
George Mason University**

**Class Syllabus for SWE 625  
Spring 2024**



# Overview of the Class Syllabus for SWE 625

- Why Take SWE 625
- Scope
- Conclusions – DIB (Defense Industrial Board) Study on Software Acquisition and Practices (SWAP) Study Biography
- Administration
- Course Text
- Major Topics
- Course Background Requirements
- Course Evaluation Procedure
- Lecture Topics and Homework Schedule
- Course Materials
- Blackboard Learn

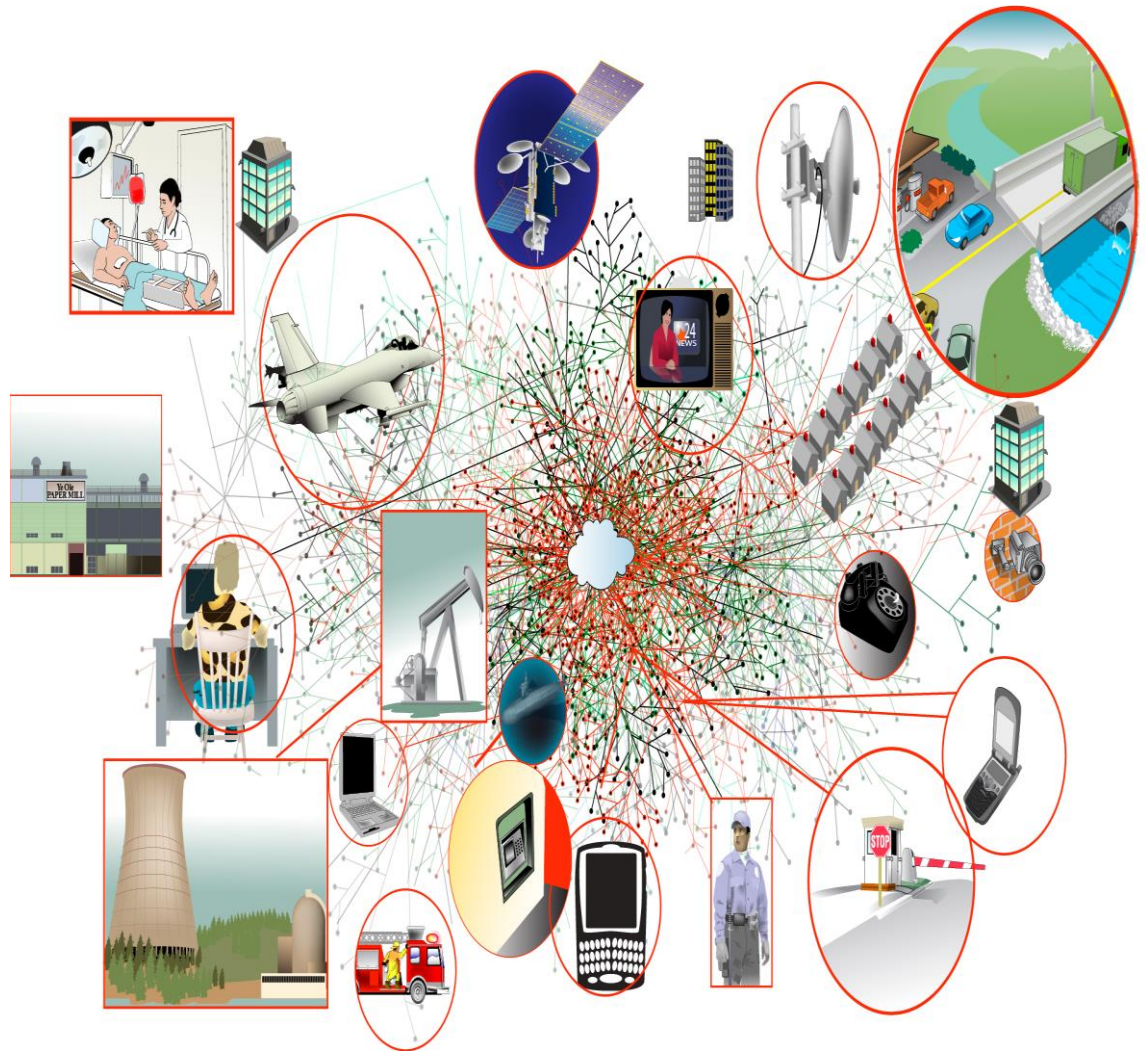
## Why Take SWE 625?

- Successfully managing software intensive projects is a **priority** for the industrial, government and academic organizations
- The ubiquity of software and its critical role require fundamental shifts in software engineering management **are necessary** to maintain competitive advantage
- The course helps participants to **rapidly deploy innovation with confidence** within this shifting landscape by:
  - Applying new principles in software **engineering management for software intensive systems**
  - Developing new practices for **enabling business/mission capability with software innovation**
- **Equips students** in applying new management techniques in today's competitive job market

# Scope of Software Engineering (SwE) Management

Mission/Business  
Success & Capability  
Focused

- System of Systems – (e.g., Cyber/Hyper-Connected and AI Engineered Systems)
- Networked Hardware/ Platforms
- Infrastructure
- Applications
- Workforce: People who digitally connect in cyberspace



# Conclusions - Defense Innovation Board (DIB) Software Acquisition and Practices (SWAP) Study – 11 Jan 2019

- **Software is ubiquitous and U.S. national security relies on software.** Well-equipped and well-trained warfighters provide the capability necessary to defend the nation, but software critically enables that mission. The ability to develop, procure, assure, and deploy software is central to national defense and integrating with allies and partners.
- **Speed and cycle time are the most effective metrics for software.** Software is a critical element of the Department's approach to executing missions, collaborating with allies, and managing its operations. DoD needs to deploy & update software at the speed of (mission) need and execute within the OODA loop of our adversaries to maintain advantage.

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The **OODA loop** is the cycle observe–orient–decide–act, developed by military strategist and United States Air Force Colonel John Boyd.

# Conclusions - Defense Innovation Board Software Acquisition and Practices (SWAP) Study – 11 Jan 2019

- **Software is made by people, for people, so digital talent matters.** DoD's current personnel processes and culture will not allow its military and civilian software capabilities to grow nearly enough. New mechanisms are needed for attracting, educating, retaining, and promoting digital talent, and providing the ecosystem that enables them to succeed.
- **Software is different than hardware (and not all software is the same).** Hardware can be developed, procured, and maintained. Software is an enduring and evolving capability that must be supported and continuously improved throughout its lifecycle. The DoD acquisition process and culture need to be streamlined for effective delivery and oversight of multiple types of software-enabled systems, at scale, and at the speed of relevance.

# Biography

## DR. KENNETH E. NIDIFFER, PMP

Dr. Nidiffer has over sixty-one years of experience in the marketing, research, development, support, maintenance, and acquisition of software-intensive systems. His 24-year career in the U.S. Air Force (where he retired as a full colonel) is marked by several firsts in software implementations, such as, first space-based compiler, first command-hardware in the loop simulation, a series of development/process standards, etc. From 1983-1986 he helped establish several noteworthy contributions, such as, the Software Productivity Consortium; the Software Project Management Program at the Defense Systems Management College; the George Mason Software Engineering Program and the Software Engineering Institute. At the Software Productivity Consortium, he launched the Consortium's business initiative in software process improvement, which became one of the largest programs in the world.

In 1991, Dr. Nidiffer left the Consortium to serve one of its founding members, Northrop Grumman, as Director of Systems Design and Development, Data Systems Division, and then as Director of Technical Operations, External Data Systems division, where he directed over 500 engineers and support personnel in the successful development of a variety of C4I, MIS/logistics, and high-speed computing systems.

# Biography

In 1995, he joined Fidelity Investments Systems Company as Senior Vice President of Quality and Systems Assurance to lead a team of 165 professionals in implementing Total Quality Management, best-in-class software engineering processes, and the largest financial services test environment. He rejoined the Consortium in 1997 as Vice President for Business Development growing the membership from 50 to 100 agencies. In 2007 he joined the Software Engineering Institute (SEI) to focus on promoting key software engineering technologies that support government programs. In 2020 he left the SEI to form his own company, Ken's Software-Enabled Systems Company.

Dr. Nidiffer has been widely published in the systems and software engineering community. He received his B.S. degree in Chemical Engineering in 1962 from Purdue University, Indiana, a M.S. degree in Astronautical Engineering in 1969 from the Air Force Institute of Technology, Ohio, a MBA degree from Auburn University, Alabama in 1975 and his D.Sc. degree from George Washington University, Washington D.C. in 1988.

He is a member of the Program Management Institute (PMI); the International Council on Systems Engineering (INCOSE); the Armed Forces Communications & Electronics Association International (AFCEA); Senior Member of the Institute of Electrical and Electronics Engineers (IEEE); the Inter-National Committee for Information Technology Standards (INCITS)/Software and Systems Engineering (INCITS/SSE) Technical Committee, Senior member of the American Institute of Aeronautics and Astronautics (AIAA); member of the National Defense Industrial Association (NDIA Systems Engineering Division); Chair of the NDIA/OSD (DDR&E) Industrial Software Committee and Co-Chair of the NDIA Systems Engineering Education and Training Committee.



## Biography

Ken is a certified logistician; a Professor Emeritus of the Defense Systems Management College; a Project Management Professional, co-editor IEEE SWEBOK (V4) – 2023, an adjunct engineering professor in graduate engineering at George Mason University for over 30 years.

Dr. Nidiffer is a man of faith and a family-oriented person. He has been married for 59 years to the former Mary Emma Walsh of Havana, Florida and they have three daughters: Sheri, Kristi and Kathi. four grandchildren and two great grandchild. In 2002 and in 2007, he was selected as the School of Information Technology's adjunct professor of the year in Software Engineering and received special recognitions for his GMU adjunct teaching service in 2002, 2007, 2009. 2013, 2017, 2018, 2022 and 2023.

**GEORGE MASON UNIVERSITY  
VOLGENAU SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING  
DEPARTMENT OF COMPUTER SCIENCE**

**COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625**

- **COURSE TITLE:** Software Engineering Project Management (SWE 625)
- **INSTRUCTOR:** Professor Kenneth E. Nidiffer
- **SEMESTER CLASSES:** Spring (22 Jan to 6 May) 2024, including final exam\*
- **SEMESTER FINAL EXAM:** 6 May, LH\*, Room 2
- **CLASS TIME/BLDG/ROOM:** 1920 – 2200; LH\*\*, Room 2

\*Note 1: Final exam is scheduled for 6 May 2024 (1930 – 2210)

\*\*LH = Lecture Hall

COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

- OFFICE HOURS: By Appointment
- Meeting Arrangement Mechanisms:
  - By appointment in class
  - By the Internet – [knidiffe@gmu.edu](mailto:knidiffe@gmu.edu) – Best Alternative
  - By note in my mailbox – Room D215A, Buchanan Hall.
  - By setting-up a conference call
  - By setting-up a Zoom Meeting – Good Alternative
  - By setting-up a video-teleconference (VTC)

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COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

- CONTACT INFORMATION:
  - Internet/E-mail: [knidiffe@gmu.edu](mailto:knidiffe@gmu.edu) (Best Method)
  - Oral Communication Mechanisms
    - Method 1: (703) 217-0215 (Cell Phone) or Text – Best Method
    - Method 2: (703) 455-4021 (Home Phone Number) – Alternative Method

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**COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625**

Textbook 1: Title - Managing and Leading Software Projects\*

Dated: 2009

ISBN 987-0-470-29455-0

Author: Dr. Richard E. (Dick) Fairley

Publisher: John Wiley & Sons, Inc.

Options to Obtain Your Own Copy:

1. Can be Pick-up at University Bookstore (located in the George W. Johnson Center)
2. Order on-line
3. Obtained previously owned book

COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625

Textbook 2: Title - Systems Engineering of Software-Enabled Systems\*

Dated: 2019

ISBN 9781119535010

Author: Dr. Richard E. (Dick) Fairley

Publisher: John Wiley & Sons, Inc.

\* Students are not required to buy the course textbooks since electronic versions are provided for free\* (A copy of each textbook has been placed in Blackboard Learn – Lecture 1 – Project Asset Library)

\* Students are expected to study and understand the contents of the course textbooks

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**COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625**

**COURSE PREREQUISITES:**

Undergraduate courses or equivalent knowledge in structured programming in a high-level language, data structures, discrete mathematics, and machine organization or assembly programming.

**COURSE DESCRIPTION:**

This course is concerned with processes involved in project planning; organizing; staffing; estimating; measuring and controlling; communication, coordination and leadership; and risk management. Topics covered include lifecycle delivery approaches; process and engineering product development models with special emphasis on the best practices contained in the Capability Maturity Model Integrated (CMMI©) constellations and product standards. The course also stresses the Program Management Institute's Program Body of Knowledge (PMBOK©) and the Software Engineering Body of Knowledge (SWBOK).

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**SOFTWARE ENGINEERING PROJECT MANAGEMENT 625**

**COURSE OBJECTIVES:**

Upon completion of this course, students will know how to develop a software project management plan for software intensive systems; how to set up monitoring and control mechanisms; how to allocate and reallocate project resources; how to track schedule, budget, quality, productivity, and progress; understand the CMMI© frameworks and how to plan for the installation and sustainment phase of the system life cycle. They will understand the importance of the work breakdown structure and its relationship to the delivery lifecycle, resource planning and execution, and progress and product measures from both a project and enterprise perspective. In addition, they will understand the relationships among quality assurance, configuration management, verification and validation, and test and evaluation. They will also gain an understanding of the key issues in costing and pricing units of effort, motivation of workers, agile development, Secure DevOps, leading project teams, machine learning, ethics and total quality management.



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**SOFTWARE ENGINEERING PROJECT MANAGEMENT 625**

**MAJOR TOPICS:**

A taxonomy of management functions; corporate goals and objectives; system, project and product (functional and non-functional) requirements; architectural frameworks; best practice frameworks, cost estimation techniques and models; software process development models with special emphasis on the CMMI© and software systems engineering delivery models; technical methods; documentation, quality assurance, configuration management, verification and validation, test and evaluation; staffing plans; monitoring and controlling mechanisms; standards (e.g. IEEE/EIA 12207 and IEEE Std. 16326™), policies and acquisition frameworks (i.e. Defense (e.g. DODI 5000.02, Defense Acquisition Guidebook (DAG) and Commercial (e.g. Infrastructure Service Provider (ISP) /Application Server Provider (ASP) frameworks; Latest lifecycle development processes; Development and Platform as a Service (PaaS), Software as a Service (SaaS)), Agile processes (e.g. DevSecOps); work packages, schedules, budget, accounting systems, costing and pricing units of effort; risk management; post deployment software support; leadership, ethics, team building and total quality. Also, Defense Innovation Board (DIB) and Defense Science Board (DSB) findings will be addressed.

## EVALUATION PROCEDURE:

Grades will be based on student homework, class contributions, student presentation and the final exam in the following proportions:

Class Contribution (Contributions In Addition to the Six Articles*)	10 %
Homework	10 %
Six Articles*	10%
Project	15 %
Student Project Presentations**	10 %
Final Exam***	45 %

Note: Final exam is scheduled for 6 May (7:30 – 10:10 pm)

\* Articles can be submitted anytime to [knidiffe@gmu.edu](mailto:knidiffe@gmu.edu). All articles must be submitted by last day of classes (29 April 2024): All articles should be accompanied with a one-page analysis of each article. Three articles are to be from refereed sources and three can be from any source.

\*\* 1920-2200/ LH, Room 2 (Project Presentation)

\*\*\* 1930 – 2210 LH Room 2 (Final Exam)

# Lecture Topics



Session	Date	Topic
1	22-Jan	Introduction to Project Management
2	29-Jan	Process Models for Software Development
3	5-Feb	Establishing Project Foundations
4	12-Feb	Plans and Planning
5	19-Feb	Project Planning Techniques
6	26-Feb	Estimating Techniques
	4-Mar	No Class - SPRING BREAK
7	11-Mar	Measuring and Controlling Work Products

# Lecture Topics

Session	Date	Topic
8	18-Mar	Measuring and Controlling Work Processes
9	25-Mar	Managing Project Risk
10	1-Apr	Teams, Teamwork, Motivation, Leadership and Communication
11	8-Apr	Organizational Issues
12	15-Apr	Furture of Software Engineering and It's Impact on Society
13	22-Apr	Student Presentations
14	29-Apr	Student Presentations
15	6-May	Final Exam

# Course Materials and Location

## Course Materials

## Location (Blackboard Learn)

- |                          |                                  |
|--------------------------|----------------------------------|
| 1. Announcements         | On-line Folder/In-class/e-mail   |
| 2. Administrative Notes  | On-line Folder/In-class/e-mail   |
| 3. Presentation (Slides) | On-line Folder                   |
| 4. Student Handouts      | On-line Folder                   |
| 5. Student Responses     | On-Line or Directly to Professor |
| 6. Graded Responses      | On-Line                          |
| 7. Student Presentation  | In-Class                         |
| 8. Student Final         | In-Class                         |
| 9. Class Contributions   | In-Class and On-line/e-mail      |

## Blackboard Learn

- Blackboard Learn (previously the *Blackboard* Learning Management System) is a virtual learning environment and course management system developed by *Blackboard* Inc.
- Used by George Mason University
- SWE 625 Course information and assignments are contained on Blackboard Learn
- Key files are “Weekly Lectures” and “Assignments”

# Blackboard Learn (Home Page)

- 202410.10163 SWE-625-001 (Spring 2024)
- Home Page
- Syllabus
- Course Content
- Assignments
- Assessments
- Discussion Board
- Tools
- Help
- Purchase Course Materials
- Library Subject Guide
- My Grades
- Course Evaluations
- Announcements
- Virtual Class
- Weekly Lectures
- Resources

Home Page

Add Course Module Customize Page

### Announcements

No Course or Organization Announcements have been posted in the last 7 days.  
[more announcements...](#)

### My Tasks

My Tasks:  
No tasks due.  
[more tasks...](#)

### What's New

No Notifications

### To Do

What's Past Due Actions

[All Items \(0\)](#)

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What's Due Actions

Select Date: 12/19/2023 Go

**Today (0)**  
Nothing Due Today

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**Tomorrow (0)**

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**This Week (0)**

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**Future (0)**

# Blackboard Learn (Lecture 1 Assignments and Hand in Requirements)

202410.10163 SWE-625-001 (Spring 2024)

Home Page

Syllabus

Course Content

Assignments

Assessments

Discussion Board

Tools

Help

Purchase Course Materials

Library Subject Guide

My Grades

Course Evaluations

Assignments

Build Content ▾ Assessments ▾ Tools ▾ Partner Content ▾

**Lecture 1 Assignment**

1. Study Chapter 1 and 2 in Textbook 1
2. Read & Provided Comments (1 Pg.): A Retrospective View of the Laws of Software Engineering, Capers Jones, 2017
3. Answer questions: 1.1; 1.3; 1:17 (Textbook No.1). Note for Question 1:17: The Text Book 1 Access link to the CMMI is broken - Need to go to FIGURE1A.1 in Chapter 1, APPENDIX 1A for Answer or the CMMI Book provided in the Project Asset Library

All assignments are to be turned in by the time of the next class period using the Blackboard Learn.

All articles should be accompanied with approximately a one-page analysis (i.e. 50% on the content and 50% on your view of the article).



# Blackboard Learn (Lecture 1 – Project Asset Library)



- Assignments
- Assessments
- Discussion Board
- Tools
- Help
- Purchase Course Materials
- Library Subject Guide
- My Grades
- Course Evaluations
- Announcements
- Virtual Class
- Weekly Lectures
- Resources
- Course Management
- Control Panel
- Content Collection
- Course Tools

[Lecture 1 Presentation File](#)

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[Test Book 1: Managing and Leading Software Projects](#)

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[Test Book 2: Systems Engineering of Software-Enabled Systems](#)

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[Retrospective View: Laws of Software Engineering](#)

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[CMMI - V3](#)

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[DIB Report \(SWAP\)](#)

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[SWE 625 Syllabus](#)

Lecture

Textbooks

Article

Reference Materials