

**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  
Fall 2021**



# Overview of the Class Syllabus for SWE 625

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- Course Materials
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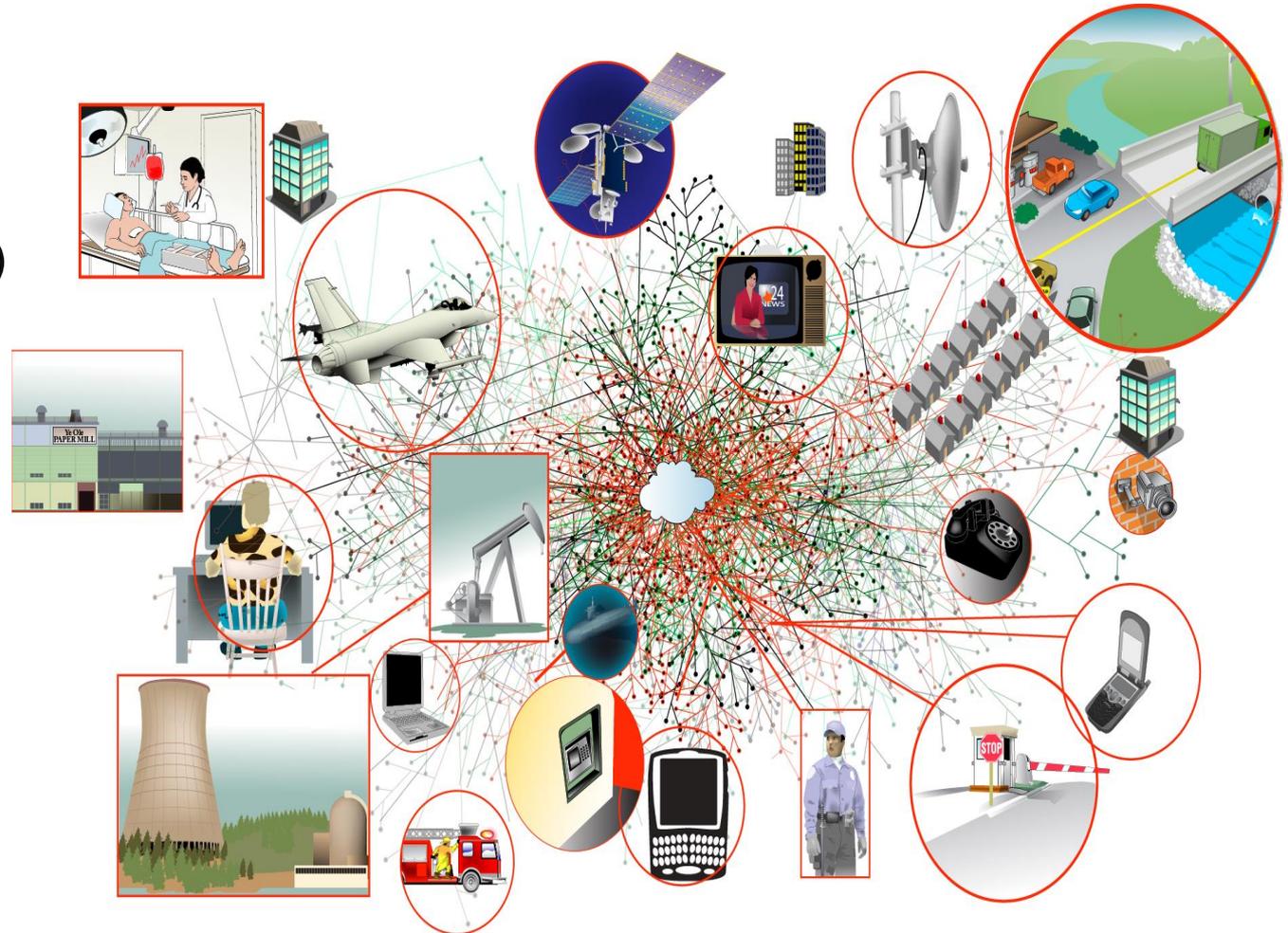
# Why Take SWE 625

- 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 and engineering 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 Focused

- System of Systems – (SwE, Cyber and AI/ML)
- Networked Hardware/ Platforms
- Infrastructure
- Applications
- Workforce: People who digitally connect to cyberspace



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# 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**

**Principal Software Engineer**

**Software Engineering Institute, Carnegie Mellon University**

Dr. Nidiffer has over fifty-nine 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 the area of 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 applications.

# 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 Air Force Association (AFA); Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and Member of the IEEE Professional and Activities Board (PAB); 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); Co-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; Industry Advisor on George Mason's Computer Science Education Committee; a Project Management Professional, co-editor IEEE SWEBOOK (V4) – 2022, an adjunct engineering professor in graduate engineering at George Mason University for over 29 years.

Dr. Nidiffer is a man of faith and a family-oriented person. He has been married for 58 years to the former Mary Emma Walsh of Havana, Florida and they have three daughters: Sheri, Kristi and Kathi. four grandchildren and one 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 2009, 2013, 2017, and 2018.

GEORGE MASON UNIVERSITY  
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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: Fall (23 Aug to 13 Dec 2021, including final exam)
- SEMESTER FINAL EXAM: 13 Dec, NE, Room 1103 \*
- CLASS TIME/BLDG/ROOM: 1920 – 2200; NE, Room 1103 \*\*

\*Note 1: The student will be provided a reading day to prepare for the final exam 13 Dec

\*\*Note 2: NE = Nguyen Engineering Building

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**COURSE OVERVIEW  
SOFTWARE ENGINEERING PROJECT MANAGEMENT 625**

- **OFFICE HOURS:** 1815 - 1900 Mondays  
ENGR 5309, Nguyen Engineering Building (Academic IV, Research II)
- Meeting Arrangement Mechanisms:
  - By appointment in class
  - By the Internet – knidiffe@gmu.edu – Best alternative
  - By note in my mailbox – Suite 4300, Nguyen Engineering Bld.
  - By setting-up a conference call
  - 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) – Good 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:

1. Can 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 – Lecture 1)
- 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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## 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; Platform as a Service (PaaS), Software as a Service (SaaS)), processes (e.g. DevSecOps) and procedures; 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.

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## 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 13 Dec 2021 (7:20 – 10:00 pm)

\* Articles are to be submitted in class. Students can submit their articles during any class period. Note: All articles will 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/ Nguyen Engineering Building, Room 1103

# Lecture Topics



Session	Date	Topic
1	23-Aug	Introduction to Project Management
2	30-Aug	Process Models for Software Development
	6-Sep	No Class - Labor Day Holiday
3	13-Sep	Establishing Project Foundations
4	20-Sep	Plans and Planning
5	27-Sep	Project Planning Techniques
6	4-Oct	Estimating Techniques
7 *	12-Oct <b>Tues</b>	Measuring and Controlling Work Products

# Lecture Topics

Session	Date	Topic
8	18-Oct	Measuring and Controlling Work Processes
9	25-Oct	Managing Project Risk
10	1-Nov	Teams, Teamwork, Motivation, Leadership and Communication
11	8-Nov	Organizational Issues
12	22-Nov	Future of Software Engineering and It's Impact on Society
13	22-Nov	Student Presentations
14	29-Nov	Student Presentations
	6-Dec	Reading Day
15	13-Dec	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                        |
| 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)

The screenshot displays the Blackboard Learn Home Page for course 202170.70179 SWE-625-001 (Fall 2021). The interface is divided into a left sidebar, a main content area, and a right-hand panel. The sidebar contains a navigation menu with icons and labels for various course functions. The main content area features sections for Announcements, My Tasks, and What's New. The right-hand panel shows a 'To Do' list with categories for Today, Tomorrow, This Week, and Future. The interface includes a search bar at the top left, a user profile icon at the top right, and a Windows taskbar at the bottom.

Navigation Menu (Left Sidebar):

- Home Page
- Syllabus
- Course Content
- Assignments
- Assessments
- Tools
- Discussion Board
- Help
- Purchase Course Material
- Library Subject Guide
- My Grades
- Course Evaluations
- Announcements
- Virtual Class
- Weekly Lectures
- Resources

Main Content Area:

- Announcements:** No Course or Organization Announcements have been posted in the last 7 days. [more announcements...](#)
- My Tasks:** No tasks are. [more tasks...](#)
- What's New:** No notifications. [Actions](#)

Right-Hand Panel (To Do):

- What's Past Due:** [Actions](#)
- All Items (0)**
- What's Due:** Select Date: 07/26/2021 [Go](#) [Actions](#)
- Today (0):** Nothing Due Today
- Tomorrow (0)**
- This Week (0)**
- Future (0)**

Windows Taskbar (Bottom):

- Search: Type here to search
- System tray: Network, Volume, Power, Date/Time (02:21 AM 7/25/2021)

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



202170.70179 SWE-625-001 (Fall 2021) Assignments

Assignments

Build Content ▾ Assessments ▾ Tools ▾ Partner Content ▾

**Lecture 1 Assignment**

1. Study Chapter 1 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)

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 - Asset Library)

The screenshot displays the Blackboard Learn interface. On the left is a dark sidebar with a menu. A green arrow points to the 'Resources' option. The main area shows a list of assets:

- Lecture 1 Presentation Charts
- Test Book 1: Managing and Leading Software Projects
- Test Book 2: Systems Engineering of Software-Enabled Systems
- Retrospective View: Laws of Software Engineering
- CMMI - V3
- DIB Report (SWAP)
- Syllabus - Spring - 2021

A bracket on the right side of the interface groups the three 'Test Book' items under the label 'Textbooks'.

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