NORWICH UNIVERSITY – FALL 2019

SOFTWARE ENGINEERING

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1. COURSE DESCRIPTION

An in-depth introduction to the software development life cycle, the techniques of information analysis, testing, and the logical specification of software. Particular attention to project management, documentation, and interpersonal communication. Utilizing industry-standard methods, the student progresses through the phases of specification, design, implementation, and testing of information systems. Object-oriented design techniques are used to design new logical and new physical systems for business-related problems. Prerequisite C" or higher in CS 140.

2. EDUCATIONAL OBJECTIVES

Students will be able to

- Explain the key points of software engineering to managers and colleagues
- Apply ethical reasoning to software engineering projects
- Describe the fundamental phases, components, advantages & management of software engineering including
    - Specification, design, implementation, validation and evolution
    - Agile software-development methodologies
    - Methods used to elicit and organize functional and non-functional requirements of software systems using requirements elicitation, specification, validation and evolution
    - System modeling techniques including contextual, interaction, structural, and behavioral models
    - Approaches to and practical aspects of object-oriented design using the universal modeling language for design patterns, implementation and open-source development
    - Validating software systems in accordance with best practices, including development testing, test-driven development, release testing and user testing
    - The software evolution processes, managing legacy systems and maintaining production systems
    - Requirements and techniques for ensuring dependability, reliability, and safety
    - Software reuse
- Describe fundamentals of
    - Component-based software engineering.
    - Distributed-software engineering
    - Service-oriented software engineering
    - Systems engineering considerations
    - Software engineering for real-time systems
- Articulate principles of software engineering including
    - Project management
    - Project planning
    - Quality management
    - Configuration management

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3. MECHANICS OF THE ONLINE COURSE

3.1 Required Textbook

Sommerville, I. (2016). *Software Engineering, 10th Edition*. Pearson. xiv + 796. Index.

Available from Norwich University Bookstore & from Amazon online for purchase

- Hardcover: ISBN: 978-0133943030. < http://tinyurl.com/y5k28nrs > (rental also listed)
- Softcover: ISBN: 978-1292096131. < http://tinyurl.com/yyke7m98 >

3.2 Minimum Technology Requirements

3.2.1 Internet Access

Students must be able to access NUoodle, the online teaching platform, and links to the Web. Students can use any Internet service provider that provides unrestricted access to these resources. If accessing a high-speed Internet service using a tower or laptop computer is impossible but there is a smart phone with Internet access, students may be able to use a hotspot from the phone to allow access from the computer.

3.2.2 Hardware

Any Internet-capable computer is acceptable. Ideally, the system should have a screen large enough to make reading documents easy. Any modern operating system will do (e.g., Windows 10, OSX, Linux…). The system must include ability to play & record sound and to display video files.

3.2.3 Software

Students will need

- Browser (e.g., Chrome, Opera…)
- Word-processor capable of reading and generating DOCX, DOC, RTF or ODT files
- Presentation software compatible with PowerPoint
- Adobe Reader or full Acrobat
- Norwich email account
- Any standard video player
- Sound-recording software
- Skype

3.3 Course Resources are Online

Course references and assignments are all made available through the Norwich University NUoodle online teaching platform. It is the student's responsibility to maintain regular contact with the class through the NUoodle platform on the assigned intranet. Additional readings and recorded lectures are also provided via the online course pages.

3.4 Deadlines for Chapter-Review Exercises & Exams

All exercises & exams will be open-book and managed via the NUoodle online platform.

Deadlines for Chapter-Review exercises are 23:55 US Eastern Time Zone (UTC-4 for Daylight Saving time & UTC-5 for Standard Time) two Sundays after the introduction of a week's topics.

Mid-term and final memo exams have specific deadlines that are listed in NUoodle and in the metadata for each exam. No late submissions are accepted without special arrangements in advance including written confirmation by the instructor.

Explanation:

In some sessions of his online and in-class courses, the instructor has tried removing deadlines from weekly work. Almost universally, this experiment has been a dismal failure; in some courses, over half the class failed the course because they were incapable of planning their time. Some students failed even to complete mid-term exams in time for mid-term grades to be reported and others tried to complete dozens of assignments requiring many hours in the last few days before grades were due.

In this course, the instructor is enforcing the posted deadlines *so that more students will be able (or forced) to complete their work successfully* without piling up impossible amounts of study and effort in the last days of the course. In addition, respecting deadlines is part of the professionalism that we expect our students to develop as they enter the real world.

4. GRADING

4.1 Weekly Chapter-Review Multiple-Choice Exercises – 20% of final grade

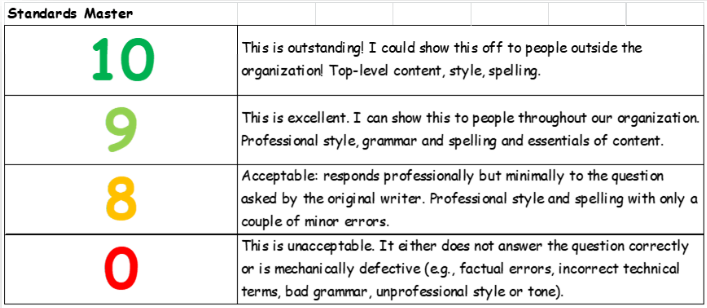
The weekly online short-answer chapter-review exercises emphasize concepts and technical vocabulary. The primary function of these exercises is to encourage review of the textbook and the notes and to help integrate concepts and terminology for the long term. All the questions that can be used in exercises are available in chapter-specific files in each week's section; students may treat these lists of questions, which are deliberately presented in alphabetical order to encourage repeated searching in the textbook, as puzzles that can improve their focus on the assigned readings. Students would do well to write out their answers for quick reference; the questions are available in both DOCX & PDF formats.

4.2 Weekly Discussions – 10% of final grade

The weekly discussions emphasize methods and professional communications. Each week, each student will answer their own choice of *any one* of the end-of-chapter exercises for each chapter from the textbook and post their answers to a weekly discussion board. Students should pick a question that has not yet been addressed by other students until all questions are listed in the discussions; after that, they may add to any of the existing threads.

The primary purpose of these discussions is to challenge students to think critically and to express themselves professionally using appropriate terminology when discussing software-engineering issues. Using the concepts and terminology in discussions is intended to solidify students' grasp of the material. These discussions also help prepare students for their memo exams.

- Answers are expected to use from 25 to 100 words depending on the complexity of the questions. There are no penalties for exceeding this suggested upper limit.
- Answers will be graded using the rubric shown here:
- No duplicates are permitted for initial postings, so when the exercises in a chapter have already been answered, the remaining students must read the responses already posted to the discussion board and then post their own thoughtful responses to a question by the deadline using the REPLY function.



Standards Master	
10	This is outstanding! I could show this off to people outside the organization! Top-level content, style, spelling.
9	This is excellent. I can show this to people throughout our organization. Professional style, grammar and spelling and essentials of content.
8	Acceptable: responds professionally but minimally to the question asked by the original writer. Professional style and spelling with only a couple of minor errors.
0	This is unacceptable. It either does not answer the question correctly or is mechanically defective (e.g., factual errors, incorrect technical terms, bad grammar, unprofessional style or tone).

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- Students may earn points by replying intelligently and substantively to other students' postings (i.e., with thoughtful additions, details or corrections – but not just useless comments such as "Good").

4.3 Mid-Term Memo Exam – 15% of final grade

Students will respond with short, professional memos to several questions ostensibly from C-level executives about various aspects of software engineering covered in the weeks before the exam. The 10-9-8-0 scale shown above will be used to grade the memos.

4.4 Mid-Term Multiple-Choice Exam – 10% of final grade

At mid-term, students will complete an online multiple-choice exam covering topics in the first part of the course.

4.5 Final Memo Exam – 20% of final grade

The final memo exam will be similar to the Mid-Term Memo exam and covering topics from the *second part* of the course (that is, the parts not covered by the first memo exam). The same scale shown above will be used for grading.

4.6 Final Multiple-Choice Exam – 10% of final grade

At the end of the course, students will complete an online multiple-choice exam covering topics from the entire course.

4.7 Course Research Project – 15% of final grade

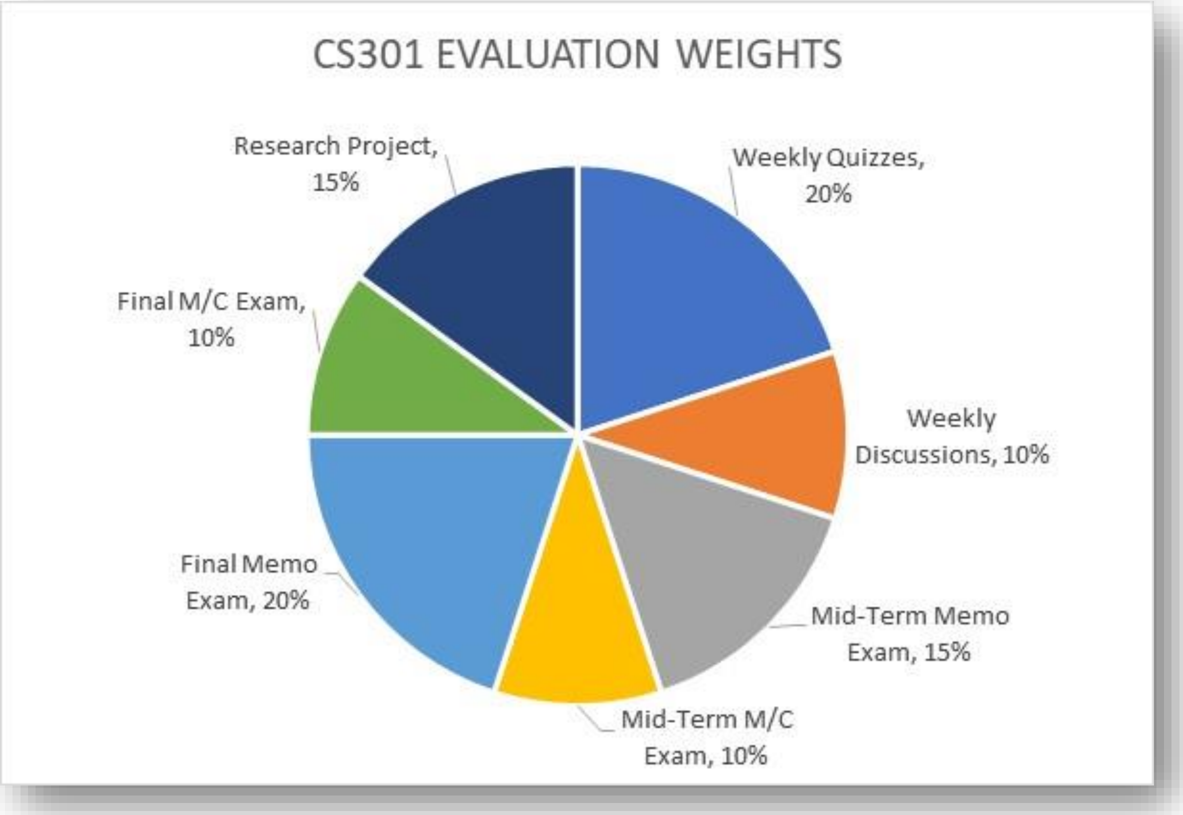
Students will propose a suitable topic in software engineering for writing a technical report, subject to approval by the instructor. Examples of suitable topics include case studies of problems, software tools, methods, and anything else the student can convince the instructor to approve.

Once the topic is approved, the student will prepare a professional-level, potentially publishable short article by the end of the course about their topic with a minimum of 2500 words and at least three specific references to substantive contributions in the professional literature (i.e., peer-reviewed articles or publications in professional journals, magazines or websites). Students may ask the instructor to review their drafts up to the time limit stated in the Syllabus.

4.8 Instructor Responses

The instructor will provide comments or grades for a submission such as discussions, memo-exams or projects within 48 hours. Quizzes are graded automatically by NUoodle.

4.9 Summary of Grading Weights



4.10 Extra Points

4.10.1 Continuous Process Improvement

Students who contribute to the Continuous Process Improvement (CPI) will receive 0.1% point per accepted suggestion or correction to be added to the final grade for the course. For example, a student who submits two accepted CPI suggestions or corrections and has a final grade of 93.8 (A-) will receive a final grade of 94.0 (A). The maximum allowable total increase from CPI contributions is 1% added to the final grade.

4.10.2 Discussions of Supplementary Materials

Students may earn 0.1% point added to the final grade for the course per accepted discussion contributions about the supplementary materials posted to the NUoodle page. The maximum allowable total increase from supplementary-material discussions is 2% added to the final grade.

4.10.3 Supplementary Essays

In addition, students may prepare independent essays with a minimum of 250 words and at least three references to the scholarly or professional publications in systems engineering on any appropriate topic approved in advance by the instructor. The rate of extra points will be 0.5% per 1,000 words to be added to the final grade. For example, a student who submits a 3,000 word extra-credit essay with a perfect score of 100% will receive an additional 1.5% added to the final grade. The maximum allowable total increase from extra-credit essays is 3% added to the final grade.

4.11 Replacement Exercises

- All multiple-choice exercises include replacement versions with the same deadlines as the original versions.
- Replacement exercises have labels ending in *r* ; e.g., *q01r* is the replacement exercise for *q01*.
- Replacement exercises fully replace a lower grade by a higher grade. Thus a 60% grade on the original exercise followed by a 100% grade on the corresponding replacement results in an exercise grade of 100% for that exercise.
- Replacement exercises cannot lower existing grades.
- These additional versions of the main exercises include 50% more questions and half the time per question.
- Students must complete the initial (shorter) version of the exercise or exam before attempting the replacement version. Any attempt to view the replacement exercise or exam *before* completing the standard exercise or exam will be considered academic dishonesty and reported to the Academic Integrity Committee.

4.12 AAC Versions

- Students who obtain authorization from the Academic Achievement Center may contact the instructor for the password required to access special version of the exercises that double the permitted time limits but are otherwise identical to the standard versions.
- These versions use the suffix *a* ; e.g., *q01* is the regular exercise 1 and *q01a* is the AAC version. The AAC version of *q01r* is *q01ra*.

5. CHEATING

- Students are encouraged to study together but **may not collaborate during exercises or exams**.
- In particular, it is specifically forbidden to share the correct answers from a completed quiz with anyone else in any way.
- Students may *discuss* responses to exercises but *may not copy/paste from each other's work*.
- Students are reminded of the University's Policy against cheating and plagiarism as defined in the *University Catalog*:
  < http://catalog.norwich.edu/residentialprogramscatalog/academicregulations/academicdishonesty/ >.
- All instances of cheating must be reported to the Academic Integrity Committee by the instructor or by students who have observed the dishonesty.
- Penalties may include expulsion from the University.
- Anyone posting the instructor's or the textbook author's materials online on plagiarism sites such as *CourseHero* will be liable to civil prosecution by the instructor and the textbook author for copyright infringement as well as being charged with academic dishonesty before the Academic Integrity Committee of Norwich University.
- Ignorance of the University's Rules is not a valid defense against accusations of academic dishonesty.

6. MORE THAN YOU NEED (OR MAY WANT) TO KNOW ABOUT YOUR INSTRUCTOR (You don't need to read this!)

M. E. Kabay began teaching his high school classmates how to use the slide rule in 1963 (NOT the best way to be popular). He was also a math tutor for seniors having trouble with matriculation exams in high school. He began programming IBM 1401 computers in assembly language in 1965 and tutored students in FORTRAN IV G when he was a freshman at McGill University starting in 1966.

He became besotted with applied statistics in his last year of work (1969-1970) on a BSc in genetics at McGill. His MSc from McGill (1970-1972) consisted of extensive statistical analysis of data on embryological development in mice.

In 1976, he completed his PhD from Dartmouth College in applied statistics and invertebrate zoology (he studied developmental responses to environmental factors in two species of rotifer).

He began teaching applied statistics at Dartmouth College in 1975 in a course for Biology graduate students. He taught applied statistics and programming (in French, his native language) at the Université nationale du Rwanda in Africa from 1976 through 1978 and at Université de Moncton in 1978-79. Later he served as adjunct faculty for a decade in the John Abbot College *Programmers' Course* and their *Technical Support Program*, the University of Ottawa *Institute for Government Informatics Professionals*, and the McGill University *Management Institute.*

In 1979, he joined a compiler team as a programmer for a new compiler and relational database language in the U.S. and then joined Hewlett-Packard Canada in 1980 as an operating-systems and database- performance specialist, winning the *Systems Engineer of the Year* Award in 1982 and teaching MPE operating system, IMAGE/3000 database and VPLUS/3000 GUI-design courses as well as serving as support engineer to HP's hospital and university customers and managing HP's bilingual call center *(Phone-In Consulting Service)* for Québec and the Maritime provinces.

From 1984 through mid-1986 he was Director of Technical Services at *Mathema*, a large service bureau for 28 companies and 1,000 live terminals.

In 1986 he formed *JINBU Corporation* and earned his living by providing operations-management analysis, database-performance and design optimization, and information-security analysis for government agencies and corporations.

He worked full time as Director of Education for the National Computer Security Association (NCSA, later ICSA and then TruSecure) from 1991 to 1999, teaching security courses around the world (and with 150,000 air miles a year during that period, he became thoroughly sick of traveling). As part of his work with the NCSA, he collaborated in the committees defining the *Common Body of Knowledge* for the *Certified Information Systems Security Professional* (CISSP) designation in the mid-1990s and earned his CISSP in 1997.

Since 1986, he has published over 2,000 articles in operations management and security, written a college textbook on enterprise security (McGraw-Hill, 1996), and served as Technical Editor of the 4th (2002), 5th (2009) and 6th (2014) editions of the *Computer Security Handbook* (Wiley). He wrote two security-management columns a week distributed by *Network World* < http://www.mekabay.com/nwss/ >from February 2000 to September 2011 and one per week for *InfoSec Perception* < http://www.mekabay.com/perception/ > from October 2011 to the end of 2013. His Website has a total of over 2,000 PDF files and over 250 PowerPoint files freely available to anyone.

He has been an invited lecturer on information security and information warfare at the United States War College, the Pentagon, NATO HQ in Brussels, and at NATO Counterintelligence training in Germany. He was inducted into the Information Systems Security Association (ISSA) *Hall of Fame* in December 2004 and earned his *Information Systems Security Management Professional* (ISSMP) designation in November 2005.

Norwich University hired him starting in the Fall 2001 semester as an Associate Professor of Computer Information Systems. He was asked to create the BSc in Computer Security & Information Assurance at that time.

From 2002 to 2009, he was the creator and Director of the *Master's Program in Information Assurance* (MSIA) in the College of Graduate and Continuing Studies (CGCS) at Norwich University, Northfield, Vermont where he was also the Chief Technical Officer of the CGCS from 2007 to 2009.

Returning to the School of Business & Management in 2009, he was promoted to Professor of Computer Information Systems in May 2011 and was appointed Associate Director of the Norwich University Center for Advanced Computing and Digital Forensics in July 2011 until 2015.

His LinkedIn page is
< http://www.linkedin.com/mkabay/ > and his Website is
< http://www.mekabay.com >.

Students are welcome to *friend* him on Facebook (but to protect their privacy, he generally does not follow students) for a stream of links to what he hopes are interesting information security and high-technology articles (mostly from *The Guardian, BBC News, Science News* and various security publications) usable in his courses. He also posts extensively on progressive politics, antibigotry activism, culture, and science (mostly from *Washington Post, National Public Radio,* and *New York Times)* and occasional funny cartoons, pictures of cute animals, and horrible puns. He does *not* post information on social media about such fascinating matters as what brand of toilet paper he prefers.

He is looking forward to retiring from Norwich University as full-time faculty on 30 June 2022 so he can write six novels based on the Parkerian Hexad, perform Mahler song-cycles as a bass-baritone soloist, and continue to read stories and poems at public libraries and for elders..

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