UNIVERSITY OF HAWAII AT HILO

CS461 – SOFTWARE ENGINEERING II
SPRING 2020

SYLLABUS

INSTRUCTOR: H. Keith Edwards
Office: College Hall 2E
Telephone: (808) 932-7522
Email: hedwards@hawaii.edu (Use Laulima for course inquiries)

TIME: Tuesday/Thursday 11:00 AM – 12:15 PM

PLACE: College Hall 11

WEB PAGE: There is a Laulima site associated with this course. Please visit
https://laulima.hawaii.edu/portal and navigate to the CS461 tab. You may also wish to keep the
CS460 tab active.

OFFICE HOURS:
Tuesday – Thursday 3:30 PM – 5:00 PM
Other times are available by appointment. I'm frequently in my office or the labs, so drop by
anytime.

OBJECTIVES AND COURSE DESCRIPTION:

In this course, we will continue to explore the discipline of software engineering. In particular,
we will examine the design and implementation phases of the software development life cycle in
more depth. For example, we will examine formal methods and system specifications while
exploring issues in system design. We will also continue exploring project management issues as
they relate to the execution and implementation phases of the project and the system development
life cycle. We will also discuss the issues involved in creating and executing formal test plans for
information systems. While it is important to know these more formal methods of software
development, we will continue with our agile development methodology in this section of the
course.

At the end of this course, students will have implemented a complex piece of software. This
coupled with the theory provided in the Sommerville and Spivey texts will give students an
appreciation for the issues involved in creating modern information systems.

COURSE (CATALOG) DESCRIPTION:
*"Emphasizes implementation, installation and maintenance phases of the SDLC covered in CS
460. Goals are to learn specific techniques and tools for product development testing,
measurement and documentation. Team will complete product. Pre: C or better grade in CS
460."*

PREREQUISITES:
In order to be enrolled in this course, you need to have completed one writing intensive course (e.g. English 209/225), the Data Structures course (Computer Science 321), and the first part of this course (CS460). This is a capstone yearlong course for computer science majors in their 3rd and 4th years. Both CS460 and CS461 must be taken during the same academic year.

TEXTS:
There are two text books for this course:

1. Software Engineering 10th Edition by Ian Sommerville. Available from Addison-Wesley, the University of Hawaii – Hilo Bookstore, and other fine retailers. ISBN 978-0-13-394303-0.
2. The Z Notation: A Reference Manual by J.M. Spivy. Available for free from Oxford University. LaTeX, Postscript, and PDF format.
    https://spivey.oriel.ox.ac.uk/wiki3/files/zrm/zrm.pdf

In addition to these texts, there will also be various readings that are available on the web and information is provided in the assignment schedule for where to find these.

ABET Students Learning Outcomes (SLO):
This course contributes to the following CS Program Outcomes (√**).**

Outcome	√		Outcome	√
1. Students will be able to apply concepts and techniques from computing and mathematics to both theoretical and practical problems**.**	√		**6.** Students will have the training to design, implement, and evaluate software systems working both individually and collaboratively**.**	√
2. Students will be able to demonstrate fluency in at least one programming language and acquaintance with at least three more.			**7.** Students will be able to communicate effectively orally and in writing.	√
3. Students will have a strong foundation in the design, analysis, and application of many types of algorithms.	√		**8.** Students will have the knowledge, skills, and attitudes for lifelong self-development.	√
4. Students will have a fundamental understanding of computer systems.	√		**9.** Students will have the ability to analyze the local and global impact of computing on individuals and society.	
5. Students will have the training to analyze problems and identify and define the computing requirements appropriate to their solutions.	√		**10.** Students will have a fundamental understanding of social, professional, ethical, legal, and security issues in computing.	√

GRADING:

Class Participation (Graded each class session)	5%
Individual Assignments (See class syllabus)	10%
Course Project - 6 Deliverables	45%
2 Tests	40%

HOMEWORK POLICY:
With the exception of 2 individual assignments, all the homework evaluations in this course will be based on the project started in CS460 during the fall 2019 semester.

EXAMINATIONS:
There will be two examinations in this course to test your understanding of the concepts presented in this course.

CLASS FORMAT:
This class will feature a **flipped classroom** where most lectures will be posted to Laulima prior to the class session. Hence, the class time will consist primarily of project work and discussions of the material. In addition, several days are designated as pure project and presentation days. See the assignment schedule for details.

It is expected that you will have read the text and watched the lecture prior to class. If you do not review the material in advance, then you will need to do so during the class time which may detract from your learning of the material[1].

ATTENDANCE AND PARTICIPATION:
Attendance is essential to your success in class. Please ensure that you are on time. If you are likely to miss an exam, please notify me prior to the exam. Learning is not passive; it is active. That means that you need to be involved during class time.

Your attendance and classroom participation is worth 5% of your overall grade for this course. I will grade participation on a weekly basis using a 10-point scale. You will receive 2.5 points for each section of the class that you attend each week. The remaining five points will be assigned based on your contributions to your team and any class discussions.

IMPORTANT DATES:
Please see the online academic calendar from the department of the registrar for dates regarding adding and dropping courses, official holidays, etc. The online academic calendar can be found under the current students section of the UH-Hilo website, which is located at: (http://hilo.hawaii.edu/registrar/currentterm.php).

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[1] We have some extra headphones.

KNOWLEDGE, SKILLS, AND ABILITIES STUDENTS SHOULD HAVE BEFORE ENTERING THIS COURSE:
Prior to taking this course, you should be able to program in a 3rd generation object oriented programming language such as Java, Python or C++. You should possess a strong understanding of fundamental algorithms, discrete mathematical structures, and fundamental data structures. Advanced concepts such as database design and graphical user interface development will enhance your ability to perform well in this class, but are not strictly necessary. You should also be familiar with the principles of English composition and be able to express ideas in writing.

KNOWLEDGE, SKILLS, AND ABILITIES STUDENTS GAIN FROM THIS COURSE:
Upon completion of the course, the successful student will be able to:
- Identify, define, explain, and illustrate the notions of software evolution, component reuse, total quality management (TQM), and the capability maturity model (CMM), system verification.
- Produce and mathematically prove a formal mathematical specification for an information system using the Z specification language.
- Distinguish between system verification and system validation in order produce a testing plan that demonstrates the system performs according to specification and fits the client's need.
- Create and present project management artifacts such as project management reports, functional specification document, and risk analyses.
- Deliver a working information system and all associated documentation to an external client.

IMPACT ON SUBSEQUENT COURSES IN CURRICULUM:
This course is required in order to graduate from the program, but does not serve as a pre-requisite for any other course in the curriculum. You should consider taking CS495 concurrently with this course.

COURSE TOPICS AND MODULES
1. Module 1: Formal Specifications and System Design
   - Background Information
   - The Z Language
2. Module 2: Verification and Validation
   - Software Testing (Verification and Validation)
   - Creating a Software Test Plan
   - Software Performance Analysis
3. Module 3 – Software Development in Detail
   - Software Reuse
   - Component Based Software Engineering
   - Socio-Technical Systems
   - Software Evolution
4. Module 4: Management and Project Implementation Issues
   - Human resources and change management in large project implementations
   - Software Cost Estimation
   - Quality Management

- Configuration and Security Management

UNIVERSITY AND DEPARTMENTAL POLICIES:

The grade of "W"(Withdrawals): Students who feel that they cannot complete a course and receive a grade that reflects their knowledge of the material may withdraw from that course before the published withdrawal deadline. The student must carry out the withdrawal process. Upon successfully dropping a course the student will receive the grade of W. DO NOT just stop attending a class without formally dropping it. This will result in the grade of F.

The grade of "I"(Incomplete): The grade of "I" is given only when a student is unable to complete a small but important part of the course because of illness or other conditions beyond the control of the student. Negligence, indifference, or a failing grade are never acceptable reasons for giving an "I". To apply for a grade of "I", the student must present to the course instructor a signed statement of the reason for the incomplete, including a detailed description of the work that is to be completed as well as a deadline for completion, which is not to exceed the date specified in the Academic Calendar. Then the student and the instructor will complete the appropriate form to issue the grade of "I".

Honesty (or lack thereof): All course work, including examinations, homework, and programming assignments, must be the individual work of the student who submits it unless specifically assigned as a group project. It is dishonest to submit as your own work anything that is copied, reproduced mechanically (such as disk file copying) or in any other way not done completely by yourself. Incidents of dishonesty will be handled according to the University procedures governing cheating and plagiarism. The following penalties may be assessed:

      An "F" for the assignment, examination, or paper involved.

or

      An "F" in the course for dishonesty in any assignment, examination or paper.

Any students who are involved in group action which makes possible cheating or plagiarism shall be subject to the same penalties as if they themselves had cheated or plagiarized.

Naturally, programming assignments are to represent your own work unless specifically assigned as a group project. In this respect, they do not differ from examinations. Since your programs are to be your own, neither the logical design nor the actual code is to be the product of a group effort or of anyone other than yourself (with the exception of code given out to the class or available from the textbook). Violations will be viewed as academic dishonesty and will be treated as such. Since nontrivial programs produced independently are invariably different, strikingly similar programs submitted for an assignment will be suspect. Should more than coincidentally similar programs be turned in, the students involved will be required to submit evidence that their programs are their own work. Both handwritten evidence and computer code will be considered. The lack of such documentation will be taken to indicate that the assignment was not your own work. For your own protection (and because it represents good programming practice), you should save all files, printouts, and other documents used to produce your programs until after you have received a final grade in the course. Failure to do so is at your own risk.

SUPPORT AVAILABLE FOR STUDENTS

UH Hilo provides a wide variety of support to students including tutoring, disability services, mental health counseling, and EEO-Title IX support:

DISABILITY SERVICES

Any student with a documented disability who would like to request accommodations should contact the Disability Services Office - Student Services Center E230, 932-7623 (V), 932-7002 (TTY), uds@hawaii.edu - as early in the semester as possible.

ACADEMIC ADVISING

Advising is a very important resource designed to help students complete the requirements of the University and their individual majors. Students should consult with their advisor at least once a semester to decide on courses, check progress towards graduation, and discuss career options and other educational opportunities provided by UH Hilo. Advising is a shared responsibility, but students have final responsibility for meeting degree requirements.

ACADEMIC INTEGRITY

Intellectual development requires honesty, responsibility, and doing your own work. All UH Hilo students are expected to know and abide by the Student Conduct Code. Acts of dishonesty, for example, plagiarism (taking thoughts/ideas or words from others), cheating, collusion, or other forms of academic dishonesty will possibly result in penalties, consequences, and/or other disciplinary actions. If you have any doubts or questions about what constitutes academic misconduct, please do not hesitate to contact me. For information about your student rights, contact Karishma Kamath, Director of Student Conduct, 932-7472, karishma@hawaii.edu.

ACADEMIC SUCCESS

Kilohana: The Academic Success Center provides a range of free, drop-in academic services and resources to all currently enrolled UH Hilo students. Services include access to peer student staff from a range of academic majors, course-related resources (handouts, practice exams, etc.) PC desktops with subject-specific software, and study environments for individuals and small groups. Please check the Kilohana website at https://hilo.hawaii.edu/kilohana/ for information, locations, and contact phone numbers for our various Centers on campus. You can also contact Karla Hayashi, Director of the Kilohana Academic Success Center, 932-7287, karlah@hawaii.edu for more information.

MENTAL HEALTH/SUICIDE PREVENTION

The UH Hilo community is committed to and cares about all students. Life at college can get complicated. Students sometimes feel overwhelmed, lost, experience anxiety or depression, struggle with relationship difficulties, family responsibilities, or diminished self-esteem. However, supportive services are available and effective. UH Hilo Counseling Services helps undergraduate and graduate students cope with difficult emotions and life stressors. Counseling Services is staffed by experienced, professional counselors, who are attuned to the diverse needs of all types of college students. The services are FREE and completely confidential. Find out more at https://hilo.hawaii.edu/studentaffairs/counseling or by calling 932-7465.

For immediate help, contact The Crisis Line of Hawaii 1-800-753-6879, the National Suicide Prevention Hotline 1-800-273-8255 (suicidepreventionlifeline.org), or text "Aloha" or "Hello" to the Crisis Text Line 741-741.

STUDENT CONDUCT

All members of UH Hilo have the right to pursue educational endeavors as part of the institution's fundamental purposes of teaching, learning, and research. Students have the responsibility to maintain standards of personal integrity (honesty, civility, and respect) that are in harmony with the educational mission of the University; to respect the rights, privileges, and property of others; and to observe University policies as well as national, state, and local laws.
The student conduct process holds students accountable for violations of university policy, which are described in the Student Conduct Code.

STUDENTS OF CONCERN

University life should be challenging not overwhelming. There may be times when students experience severe stress or distress from adjusting to college life and adapting to unforeseen changes/circumstances. Consider referring a friend, fellow classmate, or yourself to the UH Hilo CARE Team who can provide information, resources, and options for successfully navigating a challenging academic life. Typical referrals include behavior which raise significant concerns and reasonably suggests that the behavior, physical and/or emotional state:

- Presents safety issues for yourself or others; or
- May hinder one's ability to meet expected standards of conduct or achieve academic requirements; or
- May be evidence of severe emotional distress

Anyone may use this form to refer a UH Hilo student to the University's CARE Team. All matters discussed are regarded as highly confidential and are protected by the Federal Educational Rights and Privacy Act (FERPA). If you have any questions about filing a report, please contact Karishma Kamath, the Care Team Coordinator at (808) 932-7472, or karishma@hawaii.edu.

TITLE IX SYLLABUS

The University of Hawaii is committed to providing a learning, working and living environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking. If you or someone you know is experiencing any of these, the University has staff and resources on your campus to support and assist you. Staff can also direct you to resources that are in the community. Here are some of your options:

If you wish to remain **ANONYMOUS**, speak with someone **CONFIDENTIALLY**, or would like to receive information and support in a **CONFIDENTIAL** setting, contact:
- UH Hilo Counseling Services: SSC, room E-203, 932-7465
- UH Hilo Medical Services: Campus Center, room 212, 932-7369

REPORTING INCIDENTS

If you wish to **REPORT** an incident of sex discrimination or gender-based violence including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence or stalking as well as receive information and support*, contact:
- Jenna Waipa, Lead Deputy Title IX Coordinator, 932-7818, waipajk@hawaii.edu
- Jennifer Stotter, Director of the Office of Equal Opportunity & Title IX Coordinator: 932-7641, jstotter@hawaii.edu
- Kalei Rapoza, Interim Vice Chancellor for Administrative Affairs, 932-7626, kaleihii@hawaii.edu

* Please note that you do not have to file a complaint with the University to receive institutional support or assistance. For more information regarding sex discrimination and gender-based violence, the University's Title IX resources and the University's Policy, Interim EP 1.204, go to:
http://www.hawaii.edu/titleix[2]

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[2] As a member of the University faculty, I am **required to immediately report** any incident of sex discrimination or gender-based violence to the campus Title IX Coordinator. Although the Title IX Coordinator and I cannot guarantee confidentiality, you will still have options about how your case will be handled. My goal is to make sure you are aware of the range of options available to you and have access to the resources and support you need

CS461 Assignment Schedule (Tentative)
Readings and Assignment Schedule – Spring 2020

Week	Day	Date	Topic	Readings	Notes
1	Tues	Jan 14	Course Overview Meetings, Bloody Meetings	Meetings, Bloody Meetings	Let's Hope the AV System Works
	Thurs	Jan 16	More Bloody Meetings Report Writing	More Bloody Meetings Report Writing	We'll spend the first week working on some soft skills training
2	Tues	Jan 21	Overview of Formal Methods	1. Behm et al. Meteor: A successful application of B in a large project 2. Newcombe et al. How Amazon web services uses formal methods. Commun. ACM 58, 4 (March 2015), 66–73.	
	Thurs	Jan 23	Formal Methods Example: The Birthday Book	Chapter 1 of the Z Notation: A Reference Manual	Make sure you can work out this example
3	Tues	Jan 28	Formal Specifications with Z	Chapter 2 and 3 of the Z Notation: A Reference Manual	
	Thurs	Jan 30	Sprint Cycle V Checkpoint	N/A	Make sure your product owner can attend this meeting
4	Tues	Feb 4	Software Testing	Chapter 8: Sommerville	
	Thurs	Feb 6	Software Testing	Chapter 8: Sommerville	
5	Tues	Feb 11	Performance Analysis & Testing	Chapter 3: Raj Jain (The Art of Computer Systems Performance Analysis)	
	Thurs	Feb 13	Performance Analysis & Testing	JP Buzzen: Fundamental Laws of Computer System Performance	
6	Tues	Feb 18	Dependable Systems and Socio-Technical Systems	Chapter 10: Sommerville	Make sure your product owner can attend this meeting
	Thurs	Feb 20	Sprint Cycle VI	N/A	
7	Tues	Feb 25	Reliability Engineering	Chapter 11: Sommerville	
	Thurs	Feb 27	Security Engineering	Chapter 13 and 14: Sommerville	

Week	Day	Date	Topic	Readings	Notes
8	Tues	Mar 3	Software Reuse	Chapter 15: Sommerville	
	Thurs	Mar 5	Component Based Software Engineering	Chapter 16: Sommerville	
9	Tues	Mar 10	Dedicated Work Day / Test Review	N/A	Review for Test 1
	Thurs	Mar 12	Sprint Cycle VII Checkpoint	Make sure your product owners are present	Spring Break is March 16-20.
10	Tues	Mar 24	Test 1	N/A	We can be flexible with the test and sprint dates
	Thurs	Mar 26	Holiday: Kuhio Day	N/A	This is our only Tues/Thurs Holiday
11	Tues	Mar 31	Software Evolution	Chapter 9: Sommerville	
	Thurs	April 2	Software Evolution	Chapter 9: Sommerville	
12	Tues	April 7	Software Cost Estimation	Chapter 23: Sommerville	
	Thurs	April 9	Software Cost Estimation	Section 11.4 of Laudon & Laudon	These are some additional models you need to know
13	Tues	April 14	Spring Cycle VIII	Make sure your product owners are present	
	Thurs	April 16	Quality Management	Chapter 24: Sommerville	See also Chapter 20 of the Dilbert Principle
14	Tues	April 21	Quality Management	Chapter 24: Sommerville	
	Thurs	April 23	Implementation	Peter Keen – Information Systems and Organizational Change. January 1981. CACM	
15	Tues	April 28	Implementation	Are you gambling on a Magic Bullet. Markus and Benjamin. ComputerWorld 1997.	Magic Bullets are different from Silver Bullets
	Thurs	April 30	Configuration Management	Chapter 26: Sommerville	
16	Tues	May 5	Project Day and Catchup Day	N/A	
	Thurs	May 7	Test 2 or Final Presentations	N/A	Last Day of Instruction
17	Thurs	May 14	Final Exam Period Test 2 or Final Presentations		

Prepared by: H. Keith Edwards   Last Modified Date: 2020/01/08