

SENG 6275: Dependable Systems and Software Reliability

Spring 2014

Class Meeting	Tuesday and Thursday, 3:30pm – 4:45pm Science & Technology Building, Room 144 (Global Classroom)
Instructor	Dr. Mark Hills
Office	Science & Technology Building, C-110
Office Hours	Tuesday & Thursday 1:00pm – 3:00pm Wednesday 11:00am – 12:00pm Or by appointment (please email me)
Phone	252-328-9692
Email	hillsma@ecu.edu (responses within 24 hours during the week, may be slower over the weekend)
Skype	mahills
Course web page	http://blackboard.ecu.edu

Course Summary

The catalog description for this course is as follows:

Analysis, modelling, and development of dependable systems. Foundations of software reliability.

In this course we will cover a number of topics in the areas of software dependability and reliability. This includes quantitative, testing-based approaches to reliability (Software Reliability Engineering and Software Reliability Engineering Testing), language-based approaches to building dependable systems, program analysis, and lightweight formal methods.

Prerequisites

There are no official prerequisites for this course, but you should be comfortable working with software systems and should be prepared to pick up new tools and languages (you will not need to become an expert in new programming languages, but should be able to learn a new language enough to have a basic understanding of the sourcecode we will be looking at). Please schedule time to meet with me to discuss your background and preparedness for this course if you have any concerns.

Learning Outcomes

After taking this course, you should be prepared to:

- apply the quantitative and testing-based techniques from Software Reliability Engineering to develop more reliable software;
- apply software reliability models and metrics to gauge the reliability of new or existing software systems and to set reasonable reliability goals;
- use tools and languages such as JML, JavaMOP, Erlang, FindBugs, and SPARK to build and reason about reliable software systems;
- engage with, and potentially add to, the research literature on dependable software and software reliability, such as papers that appear in ISSRE, SAS, HILT, Ada-Europe, and other conferences and journals.

Textbooks

There is one required textbook for the course: *Software Reliability Engineering: More Reliable Software Faster and Cheaper*, 2nd Edition, by John D. Musa. This book is available through Amazon.com and through the ECU campus bookstore.

We will also be reading chapters from *Handbook of Software Reliability Engineering*, edited by Michael R. Lyi, and available online at <http://www.cse.cuhk.edu.hk/~lyu/book/reliability/>. This includes some overlap with the first book, but also includes a wide variety of other material. Links to these chapters will be made available when needed.

Beyond this, we will be looking at a number of research papers, and will be using tools with online manuals, FAQs, etc. Links will be posted as necessary.

Exams

The final exam for this class will be a take-home exam. The final exam period for the course (Thursday, May 8, from 2:00pm until 4:30pm) will be used to provide time for discussion and short presentations about your small team projects. You will not need to use a proctor.

Grading

Students will be evaluated based on a combination of class activities, including class participation, written discussion questions, regular quizzes, one individual project divided into multiple “homework” assignments, one group project, two research paper reviews, and a take-home final exam. The final grade will be assessed with the following criteria, with grades normalized to a 100 point scale:

Grading	
A	≥ 90
B	≥ 80
C	≥ 70
F	< 70

This grade is based on the following relative weights of the various activities:

Weighting	
Class Participation/Discussion Questions	10%
Quizzes	15%
Individual Project	25%
Group Project	20%
Paper Reviews	10%
Final Exam	20%

There are essentially two projects in the course. The first of these is an individual project (or, to some extent, a joint project with me) in applying the techniques of software reliability engineering to an open-source system. This project will include multiple milestones to go with the topics in SRE that we cover in the course, as well as some simulated data (for reliability modeling) in cases where we do not have real data to work with.

The second project will be a small group project around program analysis, lightweight verification, and language-based reliability. We will talk about several possibilities early in the class; the project will then involve performing a literature review in the area to see what has been done, and then applying program analysis, verification, or language techniques. The project should be novel, but we will discuss the scope to ensure it is achievable by the end of the semester.

Starfish

This course uses the Starfish system to provide you with information on your performance within the course. For more information, please see <http://www.ecu.edu/cs-acad/advising/upload/Starfish-Student-Getting-Started.pdf>.

Student conduct

Smoking is not permitted in classrooms. Please turn off telephones while in class. Laptops and tablets can be used for taking notes, but should not be used for other work (or recreational browsing, playing games, etc).

Students are expected to abide by the university's Student Honor Code. The homework that you do is a critical part of your education. Each student is expected to do his or her own work, except where teamwork is explicitly allowed or required. That does not mean you are not allowed to discuss your ideas with other students. Working in groups can be beneficial, and I encourage you to talk through ideas with other students. But outright copying is plagiarism and is unacceptable. Students who copy other students' work, or who allow their work to be copied, or who copy their work from other sources, such as the internet, are violating the ECU academic integrity policy.

Other potential academic integrity violations are cheating, falsification, multiple submissions of the same work in different classes, and attempts at any of these violations. Please see http://www.ecu.edu/cs-studentlife/policyhub/academic_integrity.cfm for more details.

Academic integrity violations can result in a grade penalty up to and including an F for the course.

Other Policies

No incompletes will be issued in this course except for extraordinary circumstances, and even then only if you are nearly done already, and have done work of acceptable quality, so that you have a realistic change to pass the course.

All quizzes, discussion questions, reviews, and project deliverables are due by the posted due date. There is no official extension – if for some reason you are not able to complete the assignment on time, you must contact me directly with an explanation and request an extension. If something comes up and you are having trouble keeping up with the class, talk to me right away, ***don't wait until the end of the semester!***

Course participation is an important part of the course. If you do not participate (as measured by the discussion questions and in-class discussion), you not only will lose points, but will make it harder to have the kinds of discussions we need to make the class interesting. Please read the assigned readings in a timely fashion, and come to class prepared to talk.

Success in the class is directly correlated with class attendance, so I highly recommend that you attend and actively participate. If for some reason you cannot attend, please let me know – my expectation is that you will still answer any discussion questions and then watch the lecture online (if you don't, you will lose course participation points). For online students, I recommend that you

watch the lecture the day it is given and send any questions before the next class session (so I can address them in class). Falling behind will make the course more difficult than it would otherwise be. I will be taking attendance at regular points in the class for my own records.

To encourage use of the discussion groups on Blackboard, I will not answer any questions about the course material using either email or Skype. These questions **must** be posted in the discussion groups. You are welcome to contact me directly with questions about grading or other personal class-related items, or to discuss the material with me more fully if I agree to take it “offline” from the discussion groups. I will answer questions about the syllabus, but will not answer questions where the answer is already clearly given in the syllabus.

All code, test scripts, and other software artifacts for your projects must be stored in a repository that will be created on GitHub or another source control system (I am still looking into which one). Everyone involved in the project (including me) will have access to the repository, and you must make sure the repository is kept up to date (e.g., you cannot just create the repository and then put all the code into it at the end of the semester).

Weather emergencies

In the event of a weather emergency, information about ECU can be obtained through the following sources:

ECU emergency notices <http://www.ecu.edu/alert>
ECU emergency information hotline 252-328-0062

Students with disabilities

East Carolina University seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Department for Disability Support Services located in Slay 138 ((252) 737-1016 (Voice/TTY)).

For more information, please see <http://www.ecu.edu/cs-studentlife/dss/>.

Retention Requirements

Academic requirements for retention have changed. Please be aware of the following new GPA requirements. Please discuss the retention requirements, entrance to major requirements, and your goals with your academic advisor.

GPA Hours at ECU (identified in Transcript in Banner Self Service) plus transferred credit hours	"Old" Retention Requirement All courses taken at ECU	New Retention Requirements Effective with Fall 2011 grades All courses taken at ECU
1-29 semester hours	1.6 GPA	1.8
30-59 semester hours	1.8 GPA	1.9
60-74 semester hours	1.9 GPA	2.0
75 or more semester hours	2.0 GPA	2.0

Caveats

Occasionally, it may be necessary to revise this syllabus due to extenuating circumstances. I reserve the right to revise this syllabus if the need arises. If I do so, I will provide you with advance notice.