CSC 640–Advanced Software Engineering

Spring 2019 (W 6:15-9:00 in GH 224)

http://faculty.cs.nku.edu/~waldenj

1   INSTRUCTOR INFORMATION

Name	James Walden
E-mail	*waldenj@nku.edu*
Office	GH 526
Phone	(859) 572-5571

Office Hours	
MW	1:00-2:00pm
T	1:30-4:30pm
W	9:00-10:00pm
also	by appt

2   SUMMARY

Experimentation and analytics are becoming more important in software development, with applications from choosing software development processes to the design of the user interface of an application. Students will study the process of software engineering experimentation and learn how to collect, process, analyze, and present software analytics data. Studies will read papers on a variety of empirical software engineering topics in order to understand the current state of the art in software engineering.

Prerequisites: CSC 540
Textbook: Wohlin et. Al. *Experimentation in Software Engineering*. Springer. 2012.

In addition to the textbook, students will read online resources and research papers on empirical software engineering topics.

3   STUDENT LEARNING OUTCOMES

By the end of the course, a successful student should be able to

1. Identify and understand appropriate research papers in software engineering.
2. Describe commonly used experimental designs and techniques in software engineering.
3. Explain the steps of carrying out an experiment in software engineering.
4. Explain threats to validity for an experiment.
5. Analyze data from a software engineering experiment using appopriate modern statistical methods.
6. Evaluate software engineering techniques and tools using appropriate experimental methods.

4 COURSE TOPICS

1. Empirical Strategies
2. Software Metrics
3. Software Analytics
4. Case Studies
5. The Experimental Process
6. Data Collection
7. Data Analysis
8. Model Building
9. Hypothesis Testing
10. Presenting Results

5 GRADING

Your grade in this course will be based on the following classes of assessments, each of which counts for the specified percentage of your semester grade.

Paper Reviews (15%) Students will review one paper from the empirical software engineering literature for most weeks of the semester. The review should be approximately one page in length and must follow a format specified by the instructor. Students must bring their reviews as hardcopy to class to use as a reference during class discussions and to be handed in to the instructor at the end of the class period. Paper reviews are not accepted late unless a prior arrangement is made with the instructor.

Activities (15%) In-class activities help you understand the practical aspects of security engineering. Most activities will include group work. Bring your laptop to class, so that you can work on the activities. Some activities will be completed within a single class period, while other activities will require time outside of class to complete and are due at the next class period. Activities are not accepted late.

Final Project (70%) The final empirical project requires students to replicate and extend an existing software engineering study. Students will need to read the original analyses, import and process the provided replication data, replicate the original analysis and visualizations, and extend the paper in one or more ways, such as adding research questions, data sources, or new analysis techniques. Students must make an in-class presentation, and write an 8-page report in IEEE conference paper format. Both the presentation and paper will be graded. The grade will be divided as follows, with percentages representing percentages of the semester grade: Project proposal (1%), Data analysis check-in (4%), Presentation (15%), Final paper with data, notebooks, and scripts (50%).

Your letter grade in this course will be computed using the table below.

Grade	Percent	Grade	Percent
A	93-100	C+	77-80
A-	90-93	C	73-77
B+	87-90	F	0-73
B	83-87		
B-	80-83		

6 CREDIT HOUR POLICY

In accordance with federal policy, NKU defines a credit hour as the amount of work represented in the achievement of student learning outcomes (verified by evidence of student achievement) that reasonably approximates one hour (50 minutes) of classroom instruction and a minimum of two hours of out-of-class student work. For every course credit hour, a typical student should expect to spend at least three hours per week of concentrated attention on course-related work including, but not limited to, class meeting time, reading, reviewing, organizing notes, studying and completing assignments. At least an equivalent amount of time is expected for other academic activities such as online courses, laboratory work, internships, practica, studio work and other academic work leading to the award of credit hours.

Estimates of the time required for a typical student to complete course expectations are:

In-Class (1 day x 3 hours x 15 weeks)	45 hours
Readings (2 hours x 15 weeks)	30 hours
Final Project	70 hours
TOTAL	145 hours

7 RESOURCES AND REFERENCES

Empirical software engineering resources specific to this course can be found via the Resources link on the class web site.

8 TECHNOLOGY REQUIREMENTS

Students will need to use the R programming language and RStudio on Linux for most class activities. NKU's vSphere environment will be used in some activities.

9 NON-ATTENDANCE POLICY

NKU students are expected to attend the first scheduled class session of each course for which they are enrolled. If a student does not attend the first day of class, the instructor may drop the student for non-

attendance.

Students who know they will be absent must contact their instructor(s) prior to the first class meeting to explain their absence and request to remain enrolled in the course.

10   STUDENT HONOR CODE

This Student Honor Code is a commitment by students of Northern Kentucky University, through their matriculation or continued enrollment at the University, to adhere to the highest degree of ethical integrity in academic conduct. It is a commitment individually and collectively that the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements.

Students, faculty, staff, and administrators at NKU strive to achieve the highest standards of scholarship and integrity. Any violation of the Student or Graduate Student Honor Codes is a potentially serious offense because it threatens the quality of scholarship and undermines the integrity of the community. All NKU faculty members are asked to report incidents of academic misconduct to the office of Student Conduct Rights and Advocacy. While academic in scope, a violation of the NKU Honor Code may be considered a violation of the NKU Code of Student Rights and Responsibilities and will follow the adjudication processes described therein.

Through the NKU Honor Code, students who are responsible for academic dishonesty may receive sanctions, including, but not limited to, a final grade of F, or removal from the course in which the violation occurs. Repeated violations of the NKU Honor Code, or when suspension or expulsion from NKU may be a possible outcome of the violation, the incident will be referred to the office of Student Conduct, Rights and Advocacy.

Additional information is available at: https://inside.nku.edu/scra.html#policies.

11   STUDENTS WITH DISABILITIES

The University is committed to making reasonable efforts to assist individuals with disabilities in their efforts to avail themselves of services and programs offered by the University. To this end, Northern Kentucky University will provide reasonable accommodations for persons with documented qualifying disabilities. If you have a disability and feel you need accommodations in this course, you must present a letter to me from the Disability Programs and Services Office (SU 303), indicating the existence of a disability and the suggested accommodations.More information can be found at http://disability.nku.edu.

12   STUDENT EVALUATION OF INSTRUCTOR AND COURSE

Northern Kentucky University takes Instructor and Course Evaluations very seriously as an important means of gathering information for the enhancement of learning opportunities for its students. It is an important responsibility of NKU students as citizens of the University to participate in the instructor and course evaluation process. During the two weeks prior to the end of each semester's classes, you will be asked to reflect upon what you have learned in this course, the extent to which you have invested the necessary effort to maximize your learning, and the role your instructor has played in the learning process. It is very important

that you complete the online evaluations with thoughtfully written comments.

Student evaluations of courses and instructors are regarded as strictly confidential. They are not available to the instructor until after final grades are submitted, and extensive precautions are taken to prevent your comments from being identified as coming from you. Students who complete an evaluation for a particular course (or opt out of doing so in the evaluation) will be rewarded for their participation by having access to their course grade as soon as that grade is submitted by the instructor. On the other hand, any student who does not complete the course evaluation (or opt out of doing so in the evaluation) should expect to incur a two week delay in access to his or her course grade beyond the university's official date for grade availability. To complete online evaluations go to http://eval.nku.edu/. Click on "student login" and use the same username and password as used on campus.

In addition, you should be aware that:

- Evaluations can effect change in courses. Evaluations without comments are less valuable and less credible than those filled out thoughtfully. Comments that are expressed well are more effective than those that are not.

- Positive feedback is just as important as criticism. Moreover, negative evaluations without any explanation and specifics are not especially useful.

- Once grades are submitted, all evaluations are read not only by the instructor, but also by the instructors department chairperson.

- Evaluations not only provide feedback to your instructor, but also provide information to the department chair for use in performance evaluations. This information affects reappointments, promotions, salaries, and teaching assignments.