

WEST VIRGINIA UNIVERSITY
College of Engineering and Mineral Resources
Lane Department of Computer Science and Electrical Engineering

CS 791C – Empirical Methods in Software Engineering and Computer Science
Spring 2010 - 3 credit hours

Class time: Tuesday & Thursday 2:00 – 3:15 pm
Instructor: Dr. Katerina Goseva – Popstojanova
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Location: G84
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Office hours: Tuesday & Thursday – 12:30 pm to 1:30 pm or by appointment

Prerequisites: Undergraduate classes in software engineering and statistics (CS 230 and STAT 215 or equivalent); or Instructor consent.

Course Materials:

- **Textbook:** *Experimentation in Software Engineering: An Introduction*, C. Wohlin, P. Runeson, M. Host, M. C. Ohlsson, B. Regnell, A. Wesslen, Kluwer Academic Publishers, 2000, ISBN 0-7923-8682-5
- **Papers** published in journals and conference proceedings

Course Description and Objectives: This course will address the main topics in empirical research and practice-based empirical studies in software engineering and computer science. It will describe in details the scientific process and guidelines for empirical research, particularly addressing different methods such as surveys, case studies, and experiments. The course will cover both explanatory studies and confirmatory experiments designed to test formal hypothesis. Statistical techniques commonly applied in empirical investigations will also be addressed. The course will use multiple means of evaluation, including application of methods discussed in class and planning and (partially) executing a program of empirical research which addresses an important software engineering or computer systems question. An important part of the class is the individual learning through critical analysis and evaluation of a number of published research studies and expert opinion articles.

Course Topics:

- The role of empirical studies in software engineering and computer science
- Empirical methods such as surveys, case studies, and experiments
- Data collection methods such as interviews, questionnaire, observations, and measurements
- Types of experimental design
- Qualitative data analysis methods
- Statistical analysis, including descriptive statistics, hypothesis testing, discussion of the assumptions underlying various statistical techniques and when they are appropriate
- Types of validity: conclusion, construct, internal, and external validity

Learning Outcomes:

- Knowledge of the main empirical methods, such as surveys, case studies, and experiments
- Fundamental knowledge of qualitative and quantitative data analysis methods
- Ability to plan and conduct empirical studies and to analyze, report, and interpret the results
- Ability to critically analyze and evaluate empirical papers

RULES OF OPERATION

Attendance: Students are expected to regularly attend the lectures. Students are responsible for all material covered in the course, keeping track of assignments and examination dates.

Homework assignments: Homework assignments will be due in the beginning of the class on the scheduled dates.

Peer-review and discussion of several empirical papers: Students will be required to critically analyze and formally evaluate several published papers presenting empirical studies and expert opinions. These papers typically will be chosen

from a list of papers that address specific topics taught in class. The written essays will follow review forms of relevant journals & conferences and will be due in the beginning of the class on the scheduled dates.

Project: Each student will choose one research hypothesis, describe its motivation, and design and (partially) conduct an empirical investigation which implements the methods discussed in class. The rigor of the approach taken will be given particular consideration in the grading process. Each student will give in-class presentation of the term project. These presentations will be scheduled for the last several weeks of the semester.

Late assignments are strongly discouraged and will be penalized 10% for each day late.

Exams: There will be a midterm exam and a final exam. Make-up exams will be given only by prior arrangement and only under *truly extraordinary circumstances*. Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time.

Grading: Semester grades will be computed roughly as follows

Homework assignments & Papers reviews	35%
Project & presentation	25%
Midterm exam	20%
Final Exam	20%

Grades will generally be A = 90 – 100%, B = 80 - 89%, C = 70 - 79%, D = 60 - 69%, and F = 0 – 59%.
'+' and '-' grade may be reported if the score is near boundary.

Communication: The class Web page will contain class notes, important announcements, assignments, etc. Please check the class Web page and your e-mail regularly.

Academic Integrity: The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, the instructor will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://www.arc.wvu.edu/rightsa.html>. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see the instructor before the assignment is due to discuss the matter.

Other Policies: West Virginia University is committed to social justice. The instructor of this course concurs with WVU's commitment and expects to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class please advise us and make appropriate arrangement with Disability Services (293-6700). The first week of the semester is the best time to inform your instructor of any disability.