COMP 490/L: Senior Design Project
Fall 2018

Instructor: Kyle Dewey (kyle.dewey@csun.edu)
Course Web Page: https://kyledewey.github.io/comp490-fall18/
Piazza Web Page: http://piazza.com/csun/fall2018/comp490l
Office: JD 4427, Extension 4316 (not yet connected)

IMPORTANT: This is NOT a typical senior design section. This is intended for students interested in research, graduate school, and academia. If this does not describe you, you are not in the right section. Prof. Wiegley is teaching a more traditional section which meets at the same time in JD 2213.
The traditional senior design path focuses on the planning and implementation of an industry-oriented project. While this path fits most students, it doesn't fit students who are interested in research, graduate school, and academia. This particular course section was created just for research-minded students, and it is the first such offering.

Course Description (My Own Words)
An in-depth, hands-on exposure to academic research, with particular focus on Computer Science. The ultimate end goal is to produce a publication-worthy research paper, and to learn and apply all the intermediate steps necessary to make papers happen.

Learning Objectives
Successful students will be able to:
• Find, read, and summarize papers from the literature
• Organize research notes / maintain a lab notebook
• Write a well-organized dense outline of a research paper
• Draft and edit all the necessary components of a research paper (introduction, related work, evaluation, etc.)
• Orally present their research to a general audience

Course Motivation
Research is the primary means by which technological progress is made in Computer Science. Much of this research is first distributed through scientific conferences and journals via papers. While these venues and papers are technically publicly accessible, they often seem impenetrable. Merely reading existing papers is often a challenge, and devising a research-worthy idea is difficult. Even with a great idea and high-quality work, writing a scientific paper can be a massive undertaking. In short, participating in research and contributing to research can seem like a daunting task.

While performing research can be hard, it is something that can be *learned*. Much like basic literacy, no one starts knowing how to do research, it takes lots of time to learn, but eventually you become fluent. Conducting research is dependent upon several different skill sets, many of which you may never have been exposed to. In

some cases, seemingly-related skills you have been taught are *actively harmful* for conducting research. For example:

- Some instructors encourage that books be read once, carefully, from cover to cover. This is the **most inefficient** way to read research papers, and nearly guarantees you'll waste tons of time without understanding much.
- We are often taught to write with a page minimum in mind, so most of us learn to extend ideas naturally expressed in a paragraph across whole pages. In contrast, research papers have hard page **maximums**. Scientific writing demands we condense ideas naturally expressed in a paragraph into individual sentences, or even clauses of a sentence.
- Going along with the previous point, when we have many ideas, we need to organize them appropriately. Since most people haven't needed to write something involving many ideas, most people lack these skills. Poor organization will make a paper unintelligible, and can even make it seem self-contradictory.
- Most students learn about artistic, often ambiguous writing (e.g., poetry) in the same class that teaches writing skills. Careless mixing of the two results in an indirect writing style, wherein the reader has to interpret what you *mean* as opposed to what you say. Good scientific writing leaves **nothing** to the imagination, and directly tells the reader what they need to know.
- Most students have not made many presentations, and "reading off the slides" may have been considered acceptable. If scientific ideas cannot be conveyed in a manner that is clear and engaging, then they will probably be ignored.

This class will teach you the skills you need to conduct research. The best way to learn these skills is to actually do research, and to operate with constant feedback on how you're doing. You can read about how to conduct research, and you can come to understand this on some conceptual level, but it is a whole other problem to apply what you've learned.

Course Structure

This course is based around faculty-sponsored research projects. These faculty sponsors control the majority of your grade, and will be responsible for project management. They will direct the work you need to perform, such as a code implementation, the development of a theory, the evaluation of a tool, etc. It is expected that the faculty sponsor will **not** be the same person as the instructor for most students.

Approximately the first half of the course will cover mechanical, relatively generic concepts related to research. "Generic" does not mean "inapplicable" here, but includes things like:

- How to read scientific papers, with actual project-specific reading
- How to maintain research notes or lab notebooks, with actual notes
- How to organize a research paper and actually write it, using your individual project as the research being written

The remainder of the course will involve you iteratively improving a paper draft you've written regarding your project. While we will meet regularly, this class time is primarily intended as a dedicated time slot wherein you can work on your project. This also serves as a time when you can get individual feedback as you work.

Textbook

No textbooks are required. That said, the following sources may be of interest to you:

- The Ph.D. Grind, Philip Guo (http://pgbovine.net/PhD-memoir.htm). One particular graduate student's experiences, written shortly after graduation.
    - The Ph.D. Grind, and Why Research Isn't Like Sex, John Regehr (https://blog.regehr.org/archives/743). One particular professor's take on The Ph.D. Grind.
- Surviving and Thriving in Higher Education (YouTube channel - https://www.youtube.com/channel/UC4jExrOEqgZmJM6EmziU6NA). Lots of things related to graduate school by various professors, ranging from things like how to read and write papers to social things.
- The Elements of Style, William Strunk Jr. (https://www.bartleby.com/141/). Popular, freely-available book on improving writing skills. Somewhat pedantic and occasionally difficult to work with.
- Style: The Basics of Clarity and Grace, Joseph Williams and Joseph Bizup. ~$25 used. Well-written guide to improving writing skills with tons of examples.

Grading

The faculty sponsors have a significant impact on your grade. This reflects the fact that sponsors know your project more intimately than the instructor, and so they are more apt to evaluate your performance.

Individual graded items are listed below in a chronological order of their appearance, along with who controls the item. This table also includes whether or not the item is iterative in nature; that is, if it is expected that you will revisit the same item. Most items are iterative, which reflects the paper-driven nature of the class: papers are rarely written in one sitting, especially if paper writing is used to drive the research itself.

Graded Item	Controlled By	Iterative?	Percentage
Paper Reading to Build Reading Skills	Instructor	No	2%
Paper Reading for Project Selection	Instructor	No	6%
Maintaining Research Notes	Instructor / Faculty Sponsor	Yes	5%
Deriving Paper Contributions	Faculty Sponsor	Maybe	2%
Writing Introductions - Dense Outline	Faculty Sponsor	Yes	6%
Writing Related Work	Faculty Sponsor	Yes	12%
Writing Introductions - Complete	Faculty Sponsor	Yes	8%

Graded Item	Controlled By	Iterative?	Percentage
Reviewing Introductions	Instructor / Faculty Sponsor	Yes	6%
Writing Papers - Dense Outline of Whole Paper	Faculty Sponsor	Yes	12%
Presentations	Instructor / Faculty Sponsor	Yes	15%
Writing Papers - Partial Complete	Faculty Sponsor	Yes	11%
Faculty Sponsor Dictated Milestones	Faculty Sponsor	Maybe	15%

Plus/minus grading is used, according to the scale below:

If your score is >=...	...you will receive...
92.5	A
89.5	A-
86.5	B+
82.5	B
79.5	B-
76.5	C+
72.5	C
69.5	C-
66.5	D+
62.5	D
59.5	D-
0	F

Plagiarism and Academic Honesty
You may **not** take text, code, etc. from elsewhere and claim it as your own. That said, science isn't done in a bubble, so it's expected that you will look at a variety of external sources and **cite** them appropriately. Any violations can result in a failing grade for the assignment, or potentially failing the course for egregious cases. A report will also be

made to the Dean of Academic Affairs. Students who repeatedly violate this policy across multiple courses may be suspended or even expelled.

Outside of CSUN, when it comes to publications, plagiarism in any form is egregious. Plagiarism is usually career-ending, and is on the same level as outright fraud. Citing something, in contrast, is encouraged and expected.

Attendance
In the first week of class, I will take attendance. If you miss both sessions in the first week and have not made alternative arrangements with me, you must drop the class, as per University policy (http://catalog.csun.edu/policies/attendance-class-attendance/). After the first week I will not take attendance, though you are strongly encouraged to attend.

Communication
- Piazza is strongly preferred (allows for private messages, anonymous posting, and class-wide public posting)
- Email is a fallback in case Piazza isn't working
- Do **not** use Canvas' messaging (very easy for me to miss messages)

Late Policy
Assuming prior arrangements have not been made, the default late policy follows:

If your assignment is late by <= this many days...	...it will be deducted by...
1	10%
2	30%
3	60%
4+	100%

To be clear, assignments which are submitted four or more days beyond the deadline will not receive credit.

In certain cases, assignment-specific late policies will be enforced. For certain assignments, the need for a tight feedback loop will make it impossible to accept late assignments; we will immediately build on your work, and we can't do that if we don't have the work.

Class Feedback
I am open to any questions / comments / concerns / complaints you have about the class. If there is something relevant you want covered, I can push to make this happen. I operate off of your feedback, and no feedback tells me "everything is ok". This is the first time I'm teaching this course, and it is the first time the course has had this particular structure, so I'm anticipating that it won't all be smooth sailing.

Class Schedule and List of Topics (Subject to Change)
It is anticipated that individual faculty sponsors may deviate from this schedule.

Week	Monday	Tuesday	Wednesday	Thursday
1	8/27: Introduction, motivation, syllabus	8/28: Reading papers - small	8/29: Paper discussion	8/30: Reading papers - large
2	~~9/3~~: Labor day (no class)	9/4: Paper discussion	9/5: Reading papers - large	9/6: Paper discussion
3	9/10: Project pitches	9/11: Project selection reading	9/12: Project selection reading	9/13: Project selection reading
4	9/17: Project selection reading	9/18: Project selection reading	9/19: Project selection reading	9/20: Project selection deadline; research notes
5	9/24: Dense outlines (**DO**)	9/25: Paper contributions	9/26: **DO** introduction	9/27: **DO** introduction
6	10/1: Related work	10/2: Related work	10/3: Related work	10/4: Related work
7	10/8: Full introduction	10/9: Full introduction	10/10: Full introduction	10/11: Full introduction
8	10/15: Introduction reviews	10/16: Introduction reviews	10/17: Panel: research and grad school	10/18: Handling, applying review feedback
9	10/22: **DO** paper	10/23: **DO** paper	10/24: **DO** paper	10/24: **DO** paper
10	10/29: **DO** paper	10/30: **DO** paper	10/31: **DO** paper	11/1: **DO** paper
11	11/5: Presentations	11/6: Presentations	11/7: Presentations	11/8: Presentations
12	~~11/12~~: Veteran's day (no class)	11/13: Presentations	11/14: Presentations	11/15: Presentations
13	11/19: Presentations	11/20: Paper writing	11/21: Paper writing	~~11/2~~: Thanksgiving (no class)
14	11/26: Paper writing	11/27: Paper writing	11/28: Paper writing	11/29: Paper writing

Week	Monday	Tuesday	Wednesday	Thursday
15	12/3: Paper writing	12/4: Paper writing	12/5: Paper writing	12/6: Paper writing
16	12/10: Paper writing / Presentations	12/11: Presentations	12/12: Presentations (final exam slot - 8:00 AM - 10:00 AM)	~~12/13~~: Semester over (no class)