Disclaimer: The history presented here has been pieced together from fragments of conversations the author has had with many people over the years. While intended to be an accurate accounting, it may contain factual errors and/or unrecognized biases, not to mention a few editorial opinions! Any and all who read it are invited and encouraged to set me (kmammen@calpoly.edu), and the record, straight!

**Origin Story**

Long, long ago, back in the early days of this millennium and century, faculty noticed that a significant number CSC and CPE students were failing their Operating Systems (CPE 453) and Networks (CPE 464) classes. Because these classes were/are notorious for being very challenging many/most students delayed taking them until their senior year, often during what they hoped would be their last quarter at Cal Poly before graduating. Failing one of these classes at this late date, too often, resulted in delayed graduation and in the need for more sections of these courses being offered at a time when teaching resources were already stretched thin.

At the time, CPE 315 was the prerequisite for both courses which meant that the equivalent of today’s CPE 101, 202, 203, and 315 were considered to be adequate preparation for 453 and 464. And then, as now, none of those course was taught in C. This mean students had to learn C at the same time they were learning about operating systems and networks. While many were able to do so, an uncomfortably large number of students could not.

To address the issue, Professor Hugh Smith proposed that a new course, taught in C, be created and made to be the prerequisite for 453 and 464. Professor Phil Nico thought a “systems” focus would provide the course with coherent theme and lead nicely into operating systems and networks. This resulted in CPE 317x (x for experimental) being taught Winter quarter 2002 and that course became the CPE 357 we know today.

**Nico-O’Gorman Years: 2002-2012**

Over the intervening years many people including Professor Nico himself as well as Smith, Haungs, Keen, Hatalsky, Mammen, Workman, and, primarily, O’Gorman taught variations of what is often referred to as the *Nico Version* of the class. I would describe the class as a traditional lecture/lab class focused on C and systems programming.

Pass Rate: 75% (estimate)
Class Reputation: A lot of work, learned a lot.

**The Staley Years: 2012 to 2016**

In 2012, Dr. O’Gorman, retired. At the same time the number of enrolled freshman was increasing while, at the same time, budgets were shrinking. It was then that Professor Staley stepped into the breach. I believe he was motivated by a personal interest in online education and offered to create a hybrid online class that would combine online content delivery with classroom support. Some would
call this model a “flipped” or inverted classroom. But, unlike most flipped classrooms, there would be no professor in the class – rather teaching assistants (TA) would be in the room and class time would be in computer labs where the TAs could help with the programming assignments for the class.

The great thing about this model is that it allowed the CSSE Department to offer as many sections as were needed without the need for more faculty (assuming qualified TAs could be found). But, while this model worked for the majority of students, it did suffer from a higher failure rate than the previous version of the class. Dr. Oliver calculated the pass-rate (students that earned a C- or higher) over these years to be 68% - lower than the estimated 75% or so pass-rate of the prior version of the class.

This version of the class also had a reputation for being a lot of work. An informal survey of several students that did well in the class (earned a A and subsequently became TAs for the class) suggested 35-40 hours per weeks was not uncommon. And, in addition to being a lot of work, there were some concerns that this version of the class was not preparing students as well for 453 and 464 as the prior version which, as noted above, was the primary reason for 357 to exist at all.

Pass Rate: 68%
Class Reputation: An insane amount of work, learned a lot, miss having an actual teacher in class.

2016-Present

I taught Professor Staley’s version of the class during his sabbatical (2014-2015) and offered to develop a new version of 357 during my Fall 2015-Winter 2016 sabbatical. Having taught both versions (Nico’s and Staley’s), my class is, not surprisingly, influenced by both. I would describe it as a semi-flipped model with a little more systems content that Staley’s and a little less than Nico’s. In addition, I believe my version of the class focuses more how to write and test programs than either Nico’s or Staley’s offerings.

My goals for my version of the class were:

- To increase the student pass-rate.
- To better prepare students for 453, 464, and all other classes for which 357 is a prerequisite.
- To reduce the student workload.

To these ends I have:

- Incorporating ideas and methods from the flipped, mastery, and active learning models of education.
- Introduced teams and allowing students to collaborate on assignments within their teams.
- Developed an evaluation system that provides prompt feedback and allows students to correct issues for an improved grade and, more importantly, a deeper learning experience.
- Measured the actual work done by students during the first three quarters I taught it.
- Monitored the pass-rates in CPE 357 and student subsequent outcomes in CPE 453.

The results, so far, have been gratifying. Pass rates are up, workloads are down, and students are succeeding in CPE 453! Here are a few measures:
• The average pass-rate (C- or better) in my CPE 357 from Spring 2016 through Spring 2018 is 86.72%.
• Student reported workloads averaged 22 hours per week in Spring 16, Fall 16, and Winter 17.
• 97% of students earning a C- or higher in Spring 16 and Fall 17 went on to pass CPE 453 on their first attempt.

Pass Rate: 86.72% (average S16 through S18)
Class Reputation: A lot of work, learned a lot.

The Future...

Over the last couple of years, in addition to myself, several other people have been teaching 357 including Professors Nico & Keen, lecturers Taylor, Plank, and Dunn, and in Fall 2018 graduate student Nick Gonella – I hope and believe the variety of offerings is great for students and hope such variety continues to be offered.

As for my version of the class, I continue to look for was to improve the experience and each quarter make incremental changes to lectures and assignments in hopes of further increasing the pass-rate, reducing the workload, and improving the preparation for subsequent classes and careers.