

# **Report on the Disciplinary Communication Grant**

## **Technical Writing and Communication in Computer Science**

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This document is a report on a Disciplinary Communication Grant for the development of a course on Technical Writing and Communication in Computer Science. I applied for and was awarded this grant during the academic year 2013-14. I developed the course during Fall 2014 and Winter 2015, and subsequently taught it for the first time in Spring 2015 as CMPS 185, Technical Writing and Communication in Computer Science.

### **1 Development of CMPS 185, Technical Writing and Communication in Computer Science**

The budget for this grant included funds for one course release and also funds for one undergraduate student to assist with the development of the course. Joe Rowley, a senior majoring in CE and CS (BS in CE and BA in CS) was hired as a course development assistant and worked with me during Fall 2014 and Winter 2015. Rowley had already taken CMPE 185 (Technical Writing for Computer Engineers), as well as several upper-division computer science courses.

The development of CMPS 185 began with a perusal of the scope and content of CMPE 185 (Technical Writing for Computer Engineers, at UC Santa Cruz and of ICS 139W (Critical Writing on Information Technology) at UC Irvine, which appear to be the only upper-division writing courses for computer science and computer engineering majors taught in the UC system. After this, the focus shifted on the collection of relevant material for each part of the course. This included collecting and placing in a repository approximately 100 research papers in computer science that are considered to be exemplars of technical exposition. In addition, material was collected on a number of different topics related to writing and communication in computer science, including giving talks, preparing and presenting posters, material on intellectual property, and material on ethics and responsible conduct in computer science. Following this, a detailed syllabus for the course was developed during Winter 2015 together with draft assignments for the course.

### **2 Teaching CMPS 185, Technical Writing and Communication in Computer Science**

For the first offering of the course, enrollment was limited to 35 students. All 35 students enrolled in CMPS 185 during Spring 2015 were computer science majors; several were double majors in other disciplines, such as Economics and Mathematics. The great majority of the students were seniors in their last quarter at UCSC. The course was supported by two teaching assistants, each holding half a teaching assistantship. The course was taught using slides that were developed by the instructor expressly for this course, and were posted at the course webpages right after every class. The purpose of the slides was to provide students with a written record of the topics covered in the class that could also be used as a reference later on in their professional life, when they have to write a technical document or give a technical presentation. The slides were complemented with the regular use of the blackboard and lively exchanges with the students in the form of questions and answers.

The topics covered in the course included technical typesetting using  $\text{\LaTeX}$ , resume and job application letter, basic elements of writing style (misused words, proper use of Latin abbreviations, acronyms, and footnotes), dissection of computer science articles with comprehensive coverage of the building blocks (definitions, algorithm description, theorems) and the parts (abstract, introduction, body of the article, concluding remarks) of an article, compilation of bibliographies, intellectual property and patent writing, how to give a talk to a computer science audience, and how to prepare and present a poster. In addition, the course contained a thorough discussion of the publication and dissemination practices in computer science, including the peer-review process and the differences between journal publications and conference proceeding publications. The last part of the course was dedicated to a discussion of responsible conduct in computer science, including issues of plagiarism, fabrication of data, misrepresentation of credentials, and conflict of interest. The Syllabus for the class is included in this report as Appendix A.

Students had to work on six written assignment, produce a 10-12 page term project report, give a 10-minute class oral presentation, and present a poster on their term project. For most of the written assignments, the CrowdGrader system (<http://www.crowdgrader.org/>) was used by the students to peer-review the work of other students; however, each assignment was also read and evaluated by the teaching assistants and/or the instructor, who determined

the final grades. For the oral presentations, the students had a choice between giving an overview of their term project or presenting another topic of interest; about two thirds of the class chose to give overviews of their term project. The oral presentations took place in the second half of the quarter; students were provided with feedback on their oral presentation by the instructor at the end of each week. The posters were presented at the Jack's Lounge in the Basin Engineering Building during the designated time for the final examination for the class. The instructor and the teaching assistants listened to a three minute presentation of each poster and then evaluated the poster and the presentation.

For the term projects, the students were free to choose any topic in computer science, read a number of papers, and synthesize them into a report that had the structure of an article published in a computer science journal or the proceedings of a computer science conference. The students were required to have the topic of their project and the related readings approved by the instructor; they then had to produce a one-page overview and a list of references, followed by a 3-5 page rough draft, before submitting their final term project report. The topics chosen by the students for their term project spanned a wide spectrum, from programming languages to machine learning, and from distributed systems to the effectiveness of pair programming. A listing of the titles of all term projects can be found in Appendix B of this report.

It appears that the course was received very well by the students with 94% of the respondents giving a rating of "Excellent" or "Very Good" in "The course as overall experience" category (68% "Excellent and 26% Very Good).

I appreciate the award of a Disciplinary Communication Grant to develop this course and look forward to teaching the course again during the academic year 2015-16.

## Appendix A: Syllabus of CMPS 185 - Spring 2015

CS 185

Technical Writing and Communication in Computer Science

Spring 2015

<https://piazza.com/ucsc/spring2015/cmeps185/home>

- **Time & Place:** Tuesday and Thursday 10:00–11:45a.m., Baskin Engineering 372
- **Instructor:** Phokion G. Kolaitis - <http://users.soe.ucsc.edu/~kolaitis>
  - **Contact Information:** office: E2 345A; phone: x9-4768, e-mail: [kolaitis@cs.ucsc.edu](mailto:kolaitis@cs.ucsc.edu)
  - **Office Hours:** Monday 4:00-5:00p.m. and Thursday 3:00-4:00p.m. in E2-345A
- **Teaching Assistants:**
  - Christopher Antoun, email: [cantoun@ucsc.edu](mailto:cantoun@ucsc.edu)
  - Matthew Antoun, email: [mantoun@ucsc.edu](mailto:mantoun@ucsc.edu)
- **Discussion Sections:** Each student should enroll in and attend one of the two weekly discussion sections:
  - Tuesday 2:00-3:10p.m., Baskin Engineering 169; Wednesday 12:30-1:40p.m., Baskin Engineering 169
- **Textbook:**

**Required:** *Writing for Computer Science*, by Justin Zobel, Second Edition, Springer

**Recommended:** *Mathematical Writing*, by Donald E. Knuth, Tracy Larrabee, Paul M. Roberts

**Recommended:** *Elements of Style*, by William Strunk Jr. and E.B. White, Fourth Edition
- **Objectives:** This course has two main objectives. The first objective is to prepare students to write and communicate effectively as computer science professionals. The second objective is to familiarize students with the culture and best practices of publishing in computer science. The course is particularly geared towards students planning to pursue an advanced degree in computer science.
- **Topics:** The following is a tentative list of topics that will be covered in this course: technical typesetting with L<sup>A</sup>T<sub>E</sub>X; cover letter, resumé, and statement of purpose; publication and dissemination venues in computer science: conferences, journals, and workshops; peer review and refereeing; dissection and critical analysis of published papers; oral presentations; intellectual property, invention disclosures, and patents; plagiarism and responsible conduct in research.
- **Evaluation:** The course work will be weighted as follows:

Term Project Report and Poster Presentation	40%
Oral Presentation and Slides of the Oral Presentation	10%
Written Assignments	35%
Class Participation and Peer Editing	15%
- **Term Project Report and Poster Presentation:**
  - The term project report is due before midnight on Saturday June 6, 2015.
  - The final examination for this class is scheduled 8:00-11:00a.m. on Thursday June 11, 2015. We will use this time slot for the poster presentations of the term projects. Every student enrolled in the class is required to be present, set up his/her poster between 8:00a.m. and 9:00a.m., and present it between 9:00a.m. and 11:00a.m.
- **Academic Integrity:** No form of academic dishonesty will be tolerated. *An incident of academic dishonesty may result into a zero on the course component in question or into an automatic F grade in the course.* Incidents of academic dishonesty will also be reported according to the UCSC policy on academic integrity, the full details of which can be found at [https://www.ue.ucsc.edu/academic\\_integrity](https://www.ue.ucsc.edu/academic_integrity)
- **Disability Accommodations:** If you qualify for classroom accommodations because of a disability, please get an Accommodation Authorization from the Disability Resource Center (DRC) and submit it to me in person outside of class (e.g., office hours) within the first two weeks of the quarter. Contact DRC at 459-2089 (voice), 459-4806 (TTY), or <http://drc.ucsc.edu> for more information on the process.

## Additional Information and Logistics

### A. Written Assignments

- There will be a series of written assignments throughout the course.
- Each written assignment must be produced using  $\LaTeX$  and must be submitted as a pdf file. For some assignments, you will be asked to also submit the source  $\LaTeX$  file and additional files.
- We will use Crowdgrader <http://www.crowdgrader.org/> for peer editing and peer review of these written assignments:
  - Each student will upload a pdf file with a draft document.
  - Each draft document will be read and peer edited by four different students; each peer editor will submit an annotated pdf file.
  - Each student will upload the final version of the assignment.
  - Each peer editor will read the final version of the assignment and give a grade.

### B. Oral Presentations, Term Projects, Poster Presentations

- From the sixth week of the quarter on (week of May 4, 2015), each student will have to give a ten-minute oral presentation in class, followed by a two-minute questions-and-answers period. There will be four oral presentations in each class meeting until the end of the quarter.
- Each student will work on a term project and produce a term project report. The length of this document should be between 10 to 12 pages. The term project report is due before midnight on Saturday June 6, 2015.
- Each student will present a poster about the term project between 9:00a.m. and 11:00a.m. on Thursday June 11, 2015

### C. Guest Lectures

- There will be a guest lecture on intellectual property, copyright and patent law by Vanessa Tollefson Director, Intellectual Property Management Office, UC Santa Cruz.
- There will be a guest lecture on how to write a patent by Thomas G. Zimmerman, Master Inventor and Research Staff Member, IBM Almaden Research Center.

### D. Class Rules and Expectations

- Since this course focuses on oral and written communication, attendance and class participation are required. Moreover, every one is required to participate in peer editing of the written assignments that will be submitted to CrowdGrader.
- Unless explicitly instructed, please stay off-line during class - this will allow you to focus, concentrate, and contribute.

## Appendix B: Titles of Term Projects in CMPS 185 - Spring 2015

- Reverse Engineering Mankind's Gray Matter - The Blue Brain Project
- Humanoid Artificial Intelligence and its Implications on Society
- Deep Learning - A Step Closer to Artificial Intelligence
- Supervised Machine Learning
- A Subdivision Algorithm for the Computer Display of Curved Surfaces
- Optimizing Ray Tracing for Real-Time Applications
- Digital Signal Processing and Applications in Biosciences
- Cartography, Geographic Information Systems and their Applications
- Progressive Abstraction in Programming Languages
- FORTRAN
- Alan J. Perlis and the ALGOL Programming Language
- The Rust Programming Language
- Functional Programming Languages: Haskell, OCaml, Rust, and Scheme
- Ruby Programming Language
- SQL and NoSQL
- Examining the Effectiveness of Pair Programming
- I'm Feeling Lucky: An Overview of the Methods Used to Rank Search Engine Results
- Effects of Mobile Applications
- Emergency Notification System Application: Android Applications as Safety Aids
- Responsive Web Design
- Real Time Web Frameworks: The next "big thing" in web?
- World War II Cryptography
- A Concise Overview of Public-Key Cryptography
- Malware Propagation Techniques: Viruses, Worms, and Trojan Horses
- Software Security and Vulnerabilities with an Emphasis on Backdoors
- Browser Security
- Securing RFID Technology
- CAP Theorem and Impact on Distributed Systems Design
- Ever Heard of the Byzantine's General Problem?
- How to Improve Memory Performance

- An Introduction to Supercomputing Applications
- Interactive Storytelling and Storyline Modeling
- The Gender Gap in Computer Science
- P vs. NP
- Complexity Classes and Challenges in Computing the Nash Equilibrium