Guidelines for Cooperative Education Programs and Reports for

Computer Science (CPSC) and Computer Engineering (CECN)

Texas A&M University

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Abstract

This report is intended to serve as an example of the form of COOP reports submitted to the Department of Computer Science. I intend this to be instructive. However, do’s and don’ts are scattered throughout as well.

It was created by merging:

1. the general guidelines of the Cooperative Education Office,
2. my personal guidelines that were based upon not finding appropriate information in reports, and
3. ideas that occurred to me from reviewing past reports.

The goal of this document is understanding. I hope this understanding will lead to your creating great reports everytime.

The Cooperative Education program is intended as a complement to the usual classroom and laboratory instruction. It is not an honors program nor is it remedial.

Writing is considered one of the most important skills you will use as a graduate. These rules and guidelines are intended to help you practice these skills. Your grades will reflect how well you follow and write excellent technical documents within these guidelines.

Please feel free to communicate with me on any questions you have.

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January 6, 2006
Chapter 1

Eligibility and Academic Credit

The Cooperative Education program is intended as a complement to the usual classroom and laboratory instruction. It is not an honors program nor is it remedial. You are required to enroll for a class, but there is no formal instruction. You learn by doing. You have to document your experiences. These documents are reviewed by your employers and professors. This writing experience is an important extra that COOPs get above the usual requirements of the curriculae.

COOP does not delay graduation when compared to students who pursue academics in fall and spring semesters only. The fact is that you will take one summer term and summer terms are normally one course smaller than a regular term. However, you have the opportunity to count your COOP experience as that course and a significant fraction of students take courses at local colleges and universities. So, all it takes is a modicum of planning to COOP and stay on the designed graduation schedule.

These experiences do not necessarily cause higher grades or assure the graduate of a job. It appears that COOP students graduate with higher grades and employers hiring our graduates certainly give preference for experience and COOP counts! The COOP employers have filed a statement with the university that they will provide professional guidance and mentoring. This mentoring is possibly the best benefit of the COOP experience.

The COOP program is available to all students in the department of computer science who meet the following conditions:

- are in good academic standing at the upper level,
- have an academic degree plan on file (in room HRBB 333), and
- are making good progress toward their degree in their recent semesters.

COOP is mostly for undergraduate students but consideration for graduate students is outlined below. The COOP calendar is based upon the assumption that we have three semesters per year at Texas A&M University — fall, spring, and summer. Each of the work terms will be approximately four months in length which can be accomodated without missing academic classes. I will use the words semester and term interchangeably. Further, the normal loads for the long semesters is assumed to be 16 credits and one course less in the summer.
1.1 Eligibility

The students of the Department of Computer Science must have gained upper level status before permission for beginning work will be granted. The first work period can be the first semester that the student has reached upper level. Information on this can be found on the department’s web site, search for upperlevel.

1.2 Academic Credit and Work Schedule

You must register for ENGR 385 (1 credit hour) and pay the appropriate tuition and fees for each work term. Failure to register and pay fees may result in a block from future registration. For CPSC and CPEN majors, the section number is 506 for Fall and Spring semesters and 306 for summer terms (as of Fall 2002). Three hours of ENGR 385 may be applied toward a technical elective if there is an academic semester between the first and second work terms. Also, the courses must be graded — not pass/fail.

The Department does not encourage more than three work terms. It is our view that it is a delay of your graduation which should be your goal. Extra terms will be pass/fail. We approve these in unusual circumstances. ENGR 385 credit will not be allowed on a degree plan if:

- the first two terms did not have a term of academic progress between them,
- less than two terms were worked, or
- any of the first three terms were taken pass/fail.

1.3 Graduate Cooperative Education

We will honor the requests of graduate students to participate in the coop programs to the fullest extent possible. Each case is handled on its own merits. Normally, we expect the following:

- The student will take ENGR 385 for one credit. The student may take additional credits (such as 684, 685, or 691).
- If the student graduated from Texas A&M in Computer Science or Computer Engineering and has been admitted to the graduate program, then the work terms may precede the first graduate academic semester.
- All other graduate students shall finish all necessary post baccalaureate work and obtain at least six graduate credits before the work terms.
- Graduate students will normally work two consecutive semesters. (One is often a summer semester.)
Chapter 2

Term Requirements

The goal is that each participating student should obtain a full year of work experience through alternating work terms. Writing requirements are an important part of the experience that readies you for entry into the computing profession.

**Alternating and Back-to-Back Terms.** We expect the participating students and employers agree in good faith to having a job on a year-round basis. Thus, we expect that when a student returns from a work term, another student has replaced him/her during that academic term.

Alternating periods of academics and work encourages the student to grow. One measure of this growth is selection of more challenging academic programs that meet needs the student has recognized. Another measure is that the student grows during the academic term and returns to the workplace with higher expectations of both the employer and him/herself.

We will grant permission for consecutive second and third work terms with these expectations:

- Granting of this request will not eliminate the position of another COOP student.

- The reason for the request is the uniqueness of the opportunity that the student will experience. Generally, this is of the nature that a longer term will enable the student to participate in the “team” to a fuller extent.

- The student will submit all reports at the end of each work semester.

**Work Terms for Graduate Students.** Work terms for graduate students will normally be scheduled on a different basis than undergraduate students. The coursework portion of most graduate programs is significantly shorter than the corresponding undergraduate programs. Further, one of the most significant parts of a graduate program are research projects that last for several semesters.

The graduate COOP student will usually work only two terms and they will be scheduled consecutively. All documents must be submitted at the end of each work semester, just as is required of undergraduate students.

**Grading.** Grades will be based upon the required documents and the employer’s evaluation. Failure to follow the guidelines, being late with the required documents, and simply doing substandard writing cause low grades.

I will read all reports, addendums, and evaluations. If you feel that you have received an unfairly low evaluation, please contact me personally as soon as possible for us to seek understanding and resolution. This is rare, but it has happened.
If a student works more than three terms, then these terms must be registered for on a Pass/Fail basis. Failure to do this will cause satisfactory grades to be reported as C. It is not recommended that more than three credits of ENGR 385 can be applied to any degree plan.

Graduate students should have a degree plan on file, then the chair of the student’s committee will be invited to participate in the evaluation of submitted documents. INS rules require this for international graduate students.
Chapter 3

Required Documents

All documents must be submitted each term in order to receive academic credit. Keep a copy of the report for your records in case it should get lost in the mail.

Send to Faculty Co-op Advisor: Mail to:
Co-op Report Prof. Bart Childs
Addendum Department of Computer Science
Employer Evaluation (Blue Form) Texas A&M University
College Station, TX 77843-3112

Send to the Co-op Office: Mail to:
Addendum Texas A&M University
Employer Evaluation Cooperative Education
Koldus Bldg, Suite 209
College Station, TX 77843-1476

The documents sent to the Faculty COOP Advisor should be done in a formal manner in that an appropriate letter of transmittal should have the other documents as enclosures or attachments. You should pick up the graded copy of your report from your faculty advisor after you return to campus.

3.1 Due Dates

Due dates are published in COOP registration instructions, the COOP office web site at http://co-opweb.tamu.edu and the COOP Newsletter. All reports should be post marked by this date. They roughly correspond to the end of classes during the academic semesters because grades must be reported in the same manner. Detailed instructions on the Work Experience and Research reports are included in a later chapter.

COOP reports must be postmarked by the due date to be considered on time. Late reports may cause your grade to be lowered, so contact your faculty advisor prior to the due date if you need an extension.

Failure to submit a COOP report will result in an incomplete “I.” If the incomplete is not changed by the end of the semester, it will be changed to failing “F” by the registrar.
3.2 Student Evaluation

The student evaluation (yellow form) of your COOP experience does not have to be shared with your employer. Turn this form into the COOP office within two weeks of returning to campus, and at that time provide us with a current local address.

3.3 Confidential Information

It is your responsibility to ensure that your report does not contain proprietary company information. There have been a number of students who have worked within secure environments and this has been little hinderance to writing excellent work experience and research reports.

Work experience reports are your interpretations of how you learned, how you worked, what you learned, and how you see these experiences affecting your future as a professional. If you worked for a company building a nuclear bomb, the fact that it was such is incidental. Your report is about how you as a budding computer professional worked, how you interacted with your team, how your manager led you, and etc.

A research report will have no problems with clearance from your manager unless you pick a proprietary topic. It should be simple to avoid it or to concentrate on aspects that are in the public domain.
Chapter 4

Report Requirements

Your COOP report may be either a research or a work experience paper. During your COOP career at least one of each type of report is required. I suggest that your report for the first term be a work experience and the report for the second term be a research report. Then your third one can be the one that you think will help you the most for your remaining studies. The research paper topic must be related to your major, but does not have to be directly related to your COOP assignment. A work experience paper should be an in-depth study and analysis of your COOP job experience.

4.1 Originality and Plagarism

Your COOP report is required to be original with you. I encourage you to read others and your previous reports. You have not done a good job of reading if you do not question why certain things were written or it makes you think of things you want to include that you had not previously considered. If plagiarism is discovered, you will be dismissed from the COOP program and be subject to further disciplinary action by the University.

4.2 Listings and Company Documents

Program listings are discouraged other than short coding examples. If you really feel that a listing is necessary, abstract it and enclose a diskette with a separate, detailed explanation of the exact formatting used. If you include listings in any fashion, expect me to grade them and hold them to the highest standards commensurate with my views of how they should be done [6]. Students often ask for permission to submit a document they have written as part of their job in place of the report. This is not allowed. Those documents should be ‘referenced’ and listed in the bibliography.

4.3 Positive Elements in Reports

The lists in this and the next section are intended as guidelines. They have been built from my experience on the great features and bad features of the thousand or so reports I have read. These lists include style, writing, and formatting.
1. Good English is always the first requirement. Spelling is a significant part of good English. You should remember that chapters, tables, and figures are inappropriate for action verbs. For example, “chapter 1 shows how to construct . . .” is wrong while “examples of construction . . . are in chapter 1” is appropriate [10].

2. The report should be written in the first person! It would be artificial, at best, to try to write a work experience report in third person. Most journals now accept technical papers in first person.

3. The report will be single-spaced! (Double spacing was a standard when manual typing was the means of producing documents. This allowed room for editing which became part of the document.) You can easily produce drafts and revisions. Thus, you should submit an excellent document.

4. You owe it to yourself and your work to find a formatting system where you can use an italic, bold or slanted fonts for emphasis. This enables you to avoid the use of ugly underlining from typewriter technology. In other words, do not write your grandfather’s paper!

5. The paper should never be dominated by bold, slanted, italic, or other special fonts. Complete sentences should never be in a bold font. It is unforgivable to have longer parts of a document in a bold font! Some helvetica-like fonts can be used as the primary font if it is not too bold!

6. A paper shall have a title page, table of contents, abstract, etc. The page numbers of those pages are ‘i, ii, . . . ’ The title page will have its number suppressed. Glossaries of terms, acronyms, and mnemonics are suggested when the report is quite narrow. Those ‘in the know’ often forget to communicate effectively with the common folk. The glossary should be the last of the pages with roman numerals.

7. Each line of the table of contents shall have the chapter number (for those with arabic page numbers), chapter title, and page numbers. Leaders help in a table of contents. I like to merge the table of contents, list of tables, and list of figures if the combination is still not more than one page. Number the “introductory” chapter ‘1’.

8. The first page of the “first” chapter begins with the arabic numeral 1.

9. Pages shall be numbered consecutively starting with the first chapter and continued through the bibliography. Appendices follow and may continue the numbering or be numbered like A-1, . . .

10. Chapters should start on a new page. Sections should probably start on a new page if the title and first paragraph will not fit on the current page. If you can’t figure out more than three chapters for your paper, you have not worked on it seriously enough. Chapter, section, and subsection titles should be long enough to be descriptive while avoiding verbosity.

11. Your document shall have at least a 1.5 inch margin on the left and 1.0 inch for the others. This applies to all pages. The bottom of landscape inserts is the same edge as the right margin of normal pages. It will normally be 5 to 15 pages in length.

12. If you use \TeX, \LaTeX, \traff, or can capture the output in PostScript form, you may submit it to me electronically [5], [7], [4]. Also have your manager send a message of approval or use
the mail for his/her signature. If you mail a PostScript file, make sure all necessary font information is included in the file.

13. The inclusion of graphics, tables, and pictures should be done to make or emphasize points that may not be understood. These are never done to be cute! There is a terrible tendency to do these cute tricks with Mac's, Pagemaker, etc. It is not universal that graphics are better than tables, so be careful!

14. Research and Work Experience reports are both incomplete without current references. Older references may be appropriate to show historical development. Both kinds of reports shall contain references. Make sure that you have real references, not just the computer industry equivalent of the National Enquirer, vendor hype, and/or propaganda.

15. All reports must be accompanied by the Addendum. The addendum is relevant to the work term, not necessarily the report. An outline of the addendum is included in the chapter entitled Samples.

### 4.4 Negative Elements in Reports

- We frequently use computers to emulate typewriters. We should use computers to prepare the best documents we can, not to emulate what our grandparents did with typewriters. You should have choices of many fonts! Don't be cute! Fonts other than standard proportional roman fonts should have specific reasons for use.

- Lists are special forms of paragraphs. They should be formatted in a hanging indentation form. The first line is not indented and subsequent lines are indented (like this list). **Bibliographies** are lists! **Do not** format lists like ordinary paragraphs. See the bibliography chapter.

- **Do not** underline! Emphasis of phrases should be accomplished by changing to a font related to the standard roman being used for the bulk of the document. (Underlining was a means to tell typesetters what should be italicized, bolded, or required other special handling.) The handling was to be handwritten in the margin.

- Budding computing professionals should show as many of the best elements of their profession as they can. Thus, do not use printers with resolution of less than 300 dots/inch. If you do not have such printers available to you, mail me the source on a diskette using \TeX, \LaTeX, \troff, or in PostScript form.

- **Do not** put the report in a folder. It will have been removed for my filing and the folder contributes to the pollution of the world. The folder does not contribute to readability. Staple the report in the upper left corner with one appropriate staple.

- Your report is not an advertisement nor is it a ransom note. Be discreet in the use of fonts. This document looks too much like a ransom note by the obvious use of bold, slanted, italic, sans serif, and typewriter (monospaced) fonts. This last font type should only be used for file names, command lines, URLs, and samples of messages printed on screens.

- Do not include any blank pages unless you are printing the report **two-sided**. Two sided printing requires the margins to be shifted for front and back sides.
• Most reports will have three pages of front matter, namely the title, abstract, and table of contents.

• It must be obvious to you that FAX output is of low resolution and quality. I choose not to read them except in emergencies.
  Lack of preparation on your part does not constitute an emergency on my part.
Chapter 5

Samples

Samples are included for:

- A title page. This page has a few obvious differences for the Research paper. It is shown in the form for a Work Experience paper. There are a few other words to be tailored as well.

- An Addendum. The addendum is a bit different for our department. It shall be a minimum of two pages in length. The first part is the addendum as described in the usual COOP literature. The second part is about the relevance of your experience to your curriculum as you understand it. You should probably review the Texas A&M catalog to be sure of the courses offered . . .

- The report. This document generally follows the guidelines included. If I have a bibliography for this, then surely it is a trivial matter for you to have one of equal weight and detail. The format is important in much the same manner that when you interview for a job, you put your best foot forward by being well-groomed and not wearing a tank top and shorts. Special instructions, interviews, and similar items can be cited like [3]. It is preferred to include the defining reference like [8] and [9]. It is acceptable to use references to documents like [1]. The exact format of a bibliography does not have to be like this. See [2] for a number of examples if you don’t like this one.
Software Engineering in a Megabuck Corporation

A Work Experience Paper

by

John H. Smith
Computer Engineering (or Science?) Major
Department of Computer Science
Classification (Junior, Senior, etc)
Third Co-op Work Term
(Company Name)
Fall, 20??

presented to
(Your Faculty Advisor)
Texas A&M University
May 2, 20??

Approved by:
(Your Supervisor)
(Supervisor Title)
(Company Name)
(Company Address)
(Supervisor’s Phone)
(Supervisor’s Email Address)
Addendum

Summary of Work Experience

Name of Company or Agency
Location (may be more than one line)
?st Work Term
?Semester 20??

Name of Student
Major (hint CPSC or CECN)
Classification

1. Description of Work Environment

(a) Name and type of company you worked for.
(b) Location, address, and job site(s). List required travel.
(c) Transportation issues (i.e. is a car needed?)
(d) Dress code at work...
(e) Hours of work, lunch break, overtime, flex time, ...
(f) Where you lived, housing availability, and other tips for those who follow...
(g) Colleges conveniently available for night school...
(h) Names of useful contacts for future COOPs, if any.

2. Task Assignments

(a) Description of COOP Assignment(s)
   i. Main duties and responsibilities.
   ii. Extra tasks beyond scope of normal routines.
   iii. Special accomplishments and/or special training.

(b) Human Relations
   i. Type of supervision received.
   ii. Attitude of co-workers and supervisors toward COOPs. Helpful? Supportive? Were questions encouraged?
   iii. Company policies, procedures, or practices which enhanced or inhibited learning.

(c) Technical Contents
   i. Technical aspects of the job important to your career choices.
   ii. Relationship between coursework and your job assignments.
   iii. Importance of this assignment to long-term professional development (both human relations and technical aspects).

3. Recommendations Give your recommendations about this COOP assignment to prospective COOP students. Would you recommend this assignment to other students in your major, or is this job more appropriate for another major? If so, which major(s)? If this particular assignment did not meet your expectations, would you still recommend this company to other COOP students?
Relevance of Work Experience and Education

Name of Company or Agency: Name of Student
Location (may be more than one line): Major (hint CPSC or CPEN)
?st Work Term: Classification
?Semester 20??

State a brief characterization of exactly what you did. If your job was software oriented: what operating systems, languages, and applications did you use in your work? If your job was hardware oriented: please be specific as to its nature. Include some indication of how extensive this usage was. These samples are extracted from previous addendums.

- Most of my work was testing *unix* scripts on IBM’s AIX.
- I answered the telephone on an *OS/2* help desk for customers using an “1-800” number. Most questions were answered within 30 minutes from my reading on-line help. A small percentage took me more than a half day and even fewer had to be passed on to an expert.
- I worked as a database administrator on an IBM AS400. I did little programming but what I did was evenly divided between using *SQL* calls in C and *COBOL*.
- Out editing was a snap because the company had developed an Emacs mode for our applications [9].
- Most of my programming was in a proprietary language *ProTel* with some maintenance programming of C and C++ applications.
- I spent my entire work term documenting code (in C) written by a team over the past year. I now know what professors mean when they say “self documenting code is an impossibility.”
- My primary work was on testing integrated circuits. The program driving the tests was written in C and during my use I pointed out several shortcomings. My two changes to the test program took about half my time for one week each.

You are expected to address the interaction of your education and the work experience you are finishing. Please address three topics in particular:

1. Specific courses that were of particular value for this work term. This could also include negative aspects of courses but we hope that is not the case. Why?
2. Specific courses or changes you plan to make in your courses to be taken because of your work experience. Why?
3. Specific areas that are not covered at Texas A&M in your curriculum nor in available electives.

Two items of knowledge should be at hand before you write this page. First, be sure you know what is available by studying the catalog and your degree plan [11]. Second, make sure you know the difference between being trained and being educated.

Many students will have to use Win32, *unix*, or another operating system and relate that their job would have been much easier if they had taken a course in that particular operating system [8], [1].
We have a required senior course on concepts of operating systems and feel that it is appropriate to “use” operating systems till then. It has many courses as prerequisites. Simple users of operating systems often do not need to understand but professionals will!

Students are often surprised to find that we have elective courses in networks, graphics, . . . Also, we do not offer courses in MAC programming, 486 assembler, 68000 assembler, Windows, C++, unix, . . . Our curriculum has sufficient breadth for you to learn the concepts that makes it straightforward for you to pick up specifics like these. The emphasis on concepts is an attempt to give you a broad education, not a narrow training.

The LaTeX source of this can be downloaded from the web site.

Please feel free to communicate with me on any questions you have.

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979-845-5470  coop@cs.tamu.edu

January 6, 2006
Chapter 6

Checklists

6.1 Academic Checklist

1. If you need my signature and I am not in my office, the first choice is to give it to Mrs. Morse, be sure your phone number is included. After I sign it (or mark it up), you may pick it up from her. If you do not understand my markings, you may call me or send me an email. Leave a message if I am not in and I will call you back. After just a few rings, the phone call will transfer to a secretary and she can get a message to me.

2. The COOP degree program is important to you for the purposes of scheduling your academic and work terms. It does not in any way replace the official degree plan that must be filed with HRBB 333. That one should have been done first.

3. The prerequisite structures as shown in the catalog are correct to my knowledge.

4. The majority of the courses required for both CPSC and CECN degrees are offered three semesters per year. The budget crunch may affect this in the future but we expect that it will affect the courses from the College of Engineering (which includes us) less than it will affect some others. This may affect your selection of courses you may wish to pick up while at work.

5. Always check with your advisor for the latest schedule of when elective courses are offered. We hope to continue offering CPSC 410, 431, 332, 433, and 434 three times a year and some others more than once.

6. CPSC 431 and CPSC 462 are prerequisites of CPSC 483.

6.2 Report Checklist

Consider and reconsider the structure of your document. These steps might help:

1. Before you really start to write, make a list of your chapter titles, section headings, . . . , and the thoughts to be in paragraphs. Keep this around, you will use it later.

2. When you have finished a first draft, repeat the previous step without a printed copy in front of you. Yes, do it from memory!
3. Now, make a consistency check and compare the lists from the two previous items with the real document. In particular, check:

- Table of Contents: This should be an outline of the report and also include lists of tables and figures (if any). Read the table of contents and make sure the chapter titles make sense.
- Abstract: This should include a brief summary of the objectives, conclusions, and be less than one page.
- Body: Make sure that the story you wish to tell comes across. There is usually some repetition in the abstract, introductory chapter, and summary chapter. Make sure this is not overdone. We do not have a minimum page requirement as long as you have communicated well and completely.
- Appendix: It may contain any proofs, figures, drawings which are subordinate to the main argument but are needed as supporting documentation and explanation. They must be referred to in the body of the paper and should be labeled appropriately and listed in the Table of Contents.

4. If you made significant changes, congratulations! That probably means you care about your writing and are being serious. If so, you might want to make that second list again but it probably is not necessary.

5. Now, look at your paragraphs. Make sure they are short, concise without being terse and still be long enough to complete described the subject.

6. Look at each paragraph again. How long is it? If it is a half-page or more you probably should split it. Make sure that the intended subject is in the paragraph and that is the only theme is in the paragraph.

7. Look at it all again and make sure there is no underlining!

   **Before Mailing:**

8. Make sure your supervisor has signed your report and his/her phone number and / or email address is correct.

Bibliography


