CMPE-250
Assembly and Embedded Programming
Spring 2021
Laboratory and Report Guidelines

For the best lab experience, students need to work on lab exercises *before* their scheduled lab period—not just the prelab work. Other than tutorials intended to be performed during the lab period, after the first few weeks, it is extremely unlikely that lab exercises can be started and completed in a single lab period. A best practice would be to make as much progress as possible individually before the lab period, and then to use the lab period to demonstrate the exercise and to get any assistance needed from the lab instructor and teaching assistants. Concepts needed to complete lab exercises are covered in prior lecture material, which often includes similar worked examples or develops pseudocode. Furthermore, most lab exercises build on concepts and/or work from earlier lab exercises. Therefore, the following grading policies, including prelab work deadlines and late penalties, are intended to encourage and reward keeping current in lecture and lab for an effective and efficient lab experience.

Laboratory Policies and Procedures

The lab component of this course has the following policies and procedures.
- Each lab exercise has a grading sheet on the myCourses lecture section, which serves as a grading rubric.
- Most exercises require prelab work, which may be worth a significant portion of the lab grade (up to 20%). It is important to complete this work *before lab*, because it *cannot be submitted after the first twenty (20) minutes of the scheduled lab time*. The prelab work must be submitted in Microsoft Word, PDF, or text format to the myCourses assignment designated for it. The prelab work for a scheduled exercise is due regardless of whether the previous lab exercise has been completed.
- Completion of each lab exercise must be demonstrated for an instructor or teaching assistant. If there is no record of a demonstration, demonstration points will be determined by the grading instructor or teaching assistant based on building and running the source code submitted to the myCourses assignment for the lab exercise. Since no points will be awarded if the submitted code does not build and run correctly, students are strongly encouraged to complete a demonstration. In cases of incomplete solutions, partial functionality may be demonstrated to earn part of the demonstration points, as indicated on the grading sheet for the exercise.
- There are *two minimum requirements* that *each* must be *satisfied* to be eligible *for any grading credit* on a lab exercise (and by the due date for full credit).
  1. A demonstration of the exercise to an instructor or teaching assistant (either in person or online) recorded in the myCourses lab section grade book.

2. The documentation specified for the exercise, that is the original writing of the author—not copied in part or whole from any other source—submitted to its myCourses lab section assignment in Microsoft Word or PDF format. If the exercise specifies a lab report, it must comply with the "Report Requirements" section that follows.

- Unless stated otherwise, a completed lab exercise is due at 11:59 p.m. *one week after* the exercise was scheduled to be performed. (For example if a lab exercise is scheduled for a lab period at 10:00 a.m. on Monday, January 18, the completed exercise is due at 11:59 p.m. the following Monday, January 25.) Each lab exercise specifies what must be completed and submitted for it, such as prelab work, a demonstration, grading sheet, assembly source code, listing file, map file, and documentation.

- There is a significant penalty for late submission, determined by number of days (or fraction thereof) late: for each day late from one through four, 10% per day, and for each day late from five through seven, 20% per day. Since the due date for an exercise typically coincides with the due date for the next exercise's prelab work, there will be a reduced late penalty if the next prelab work is submitted on time. The table below summarizes the late penalty applied for late submission, (i.e., the percentage deducted from the lab grade for an exercise). The time of submission is determined from the latest myCourses assignment submission time for all required work.

Late Submission Grade Penalty Percentage

Lab Exercise n	Penalty (%) Based on Lab Exercise $n + 1$ Prelab	
Late Submission (days)	No Prelab	On-Time Prelab
up to 1	−10	−5
more than 1, up to 2	−20	−10
more than 2, up to 3	−30	−15
more than 3, up to 4	−40	−20
more than 4, up to 5	−60	−30
more than 5, up to 6	−80	−40
more than 6	−100	−100

For an example of the late submission penalty, consider the following submission.
- Monday was the due date for completing the previous lab exercise (at 11:59 p.m.).
- Monday was the due date for prelab work on the next exercise (during the first 20 minutes of the lab session).
- The myCourses prelab assignment submission time shows that the next prelab work was submitted on time.
- The myCourses assignment submission time for the previous exercise shows 10:00 a.m. the next day (Tuesday)
- According to the rubric on the grading sheet, 85 points were earned for the previous lab exercise.

Based on the late submission penalty table, the lab grade would be penalized 5% and therefore would be recorded as 80.75, (i.e., $85 - [0.05 \times 85] = 85 - 4.25$).

1. This policy allows at least one week following the scheduled lab time to complete and submit the requirements without penalty for full grading credit, (except for prelab work, which must be submitted within the first 20 minutes of the scheduled lab time).
2. This policy allows six (6) additional days following the on-time submission deadline to complete and submit the requirements with a late penalty deducted.
3. This policy is intended to keep lab work on schedule since subsequent weeks in lab routinely depend on the work from earlier weeks. After the time has passed for grading credit on an exercise, the student should move to the next exercise to ensure maximum grading credit for the next exercise. Most functionality needed from a previous exercise can be provided by an instructor or teaching assistant in one or more libraries.

- Absences should be avoided since there are limited time frames when lab work is eligible for grading credit and since subsequent exercises may build on previous exercises. If an absence is completely unavoidable, the best option is to pre-arrange it with the lab instructor; otherwise, arrangements should be made with the lab instructor as soon as possible after the missed session. Requesting arrangements for work missed is the responsibility of the student, and all arrangements are solely at the discretion of the lab instructor.
- For any incomplete lab exercises with functionality needed for subsequent exercises, see a course instructor or teaching assistant about obtaining a library for the missing functionality.
- *Passing this course requires passing the lab, which means earning at least 65% of possible lab points.*

Report Requirements

- All lab reports and documentation must include the completed lab cover sheet specified for this course. The cover sheet should be the first page of the report. Edit "Laboratory Report/Documentation Cover Sheet" (on the myCourses lecture section) to generate the lab cover sheet with the required information. If a lab exercise requires additional material to be submitted with the report, include that material at the end of the report.

- All reports must be typed in 11- or 12-point fonts with full justification, (e.g., "justified" alignment in Microsoft Word). Use this document as a guide for section and paragraph formatting.
- Nothing in a report should be hand drawn or hand written. If the report requires information from prelab work that was submitted hand drawn or hand written, that prelab information must be drawn or typed by computer for the report. Furthermore, any hand-drawn or hand-written item will be treated as not submitted—unless specifically approved by the lab instructor, as indicated by his/her signature on the grading sheet.
- All figures and tables must be integrated into the report; they must be properly labeled, introduced, and explained in text. Following IEEE writing conventions, a figure label goes below the figure, whereas a table label goes above the table.
- The report must be written only in third person—not using "I," "me," "my," "we," "us," "our," "you," "your," etc. Also avoid a writing style which talks about any person—"one," "the student," "the TA," or "the instructor." Such problems are easily avoided if writing perspective is focused solely on the technical content of what was done in lab rather than on the classroom experience. The following two examples demonstrate (☒) writing to avoid and (☑) how the writing could be improved.

☒ One must write a program to evaluate an expression.

☑ A program was written to evaluate the expression $3X + 5Y$ from left to right, observing algebraic order of operations.

☒ The student must design a serial communication driver.

☑ A serial communication driver was developed to provide communication with a terminal at 9600 baud using a format of 8 data bits, no parity, and 1 stop bit.

- In writing, choose a tense appropriate to the content of the report, and avoid unnecessary tense shifts. For example, write about specific procedures or results from your work in past tense (since they are already completed), but write about general statements of fact in present tense (since they always apply). The following are some examples of using appropriate tense in typical sections of a lab report.
  - (Procedure) A program *was written* to evaluate the expression $3X + 5Y$ from left to right, observing algebraic order of operations. [*past tense*: completed action]
  - (Procedure) The program *takes* the values of two memory variables X and Y. [*present tense*: always happens with this program]
  - (Results) With inputs $X = 3$ and $Y = 2$, the program *computed* 19 for the result of expression. [*past tense*: completed action]
  - (Results) The program *computes* the result of the expression based on the provided inputs X and Y. [*present tense*: always happens with this program]
  - (Conclusions) The program *computed* the correct results for all inputs tested. [*past tense*: completed action for this specific set of test data]
  - (Conclusions) This program *evaluates* the expression $3X + 5Y$ for any valid set of inputs X and Y. [*present tense*: always happens with this program]
- Grammar, punctuation, and mechanics of writing count for 10% of the laboratory grade. Proofread carefully and completely to maximize this portion of the grade.

Report Sections

The "Report" section at the end of a lab exercise specifies the specific sections required for the report on that exercise, which may vary for each exercise. The expectations for each of these report sections are explained in one of the following subsections of this document. In addition to the content guidelines that follow, each section must also conform to the preceding "Report Requirements" section of this document.

Abstract. The abstract presents the reader of the report with a brief overview of the lab exercise. By reading the abstract the reader should know what the rest of the report entails—not only what was done, how it was done, and the results, but also the concepts that were explored in the exercise, (e.g., emulator environment, arithmetic instructions, etc.). Note that the abstract is *not simply a copy of the objective(s)* from the lab exercise. The abstract must begin by establishing the scope of the exercise and expressing its purpose in the writer's own words. It then very briefly summarizes the lab procedure and concludes with a summary of the results. Thus, the abstract is a succinct yet complete summary of the report.

Design Methodology. The design methodology presents much of the *theory* behind the lab exercise, which was incorporated in the program. Figures, equations, and tables are often very effective in this presentation. Any figures or tables should be integrated within the report and must be properly labeled, referenced, and explained in text, (e.g., "the final design of the timer game is depicted in Figure 5"). The design methodology should stand on its own objective technical merit without any reference to class or lab, (e.g., not any of the following: ~~"the design methodology was based on the lab exercise,"~~ ~~"the specifications given by the instructor were followed,"~~ etc.).

Procedure. The procedure tells what was done and how it was done in a chronological, narrative style—in contrast to a lab exercise's procedure section, which is typically written in imperative style, (i.e., list of instructions). The report's procedure should tell in the writer's own words what was actually done in lab. From reading the procedure, the reader should be able to perform the exercise to get the same results as the writer presents.

Results. The results section provides the reader with all results that came from completing the lab exercise, (e.g., any register values or memory contents that were generated). For most exercises, the results can be incorporated in a figure from a screen capture or from a log file. As in the rest of the report, every figure, table, etc. must be properly labeled, introduced, and discussed in text.

Conclusion. The conclusion section provides the reader with insights that came from completing the lab exercise. It describes the lessons learned in the exercise and analyzes the results. It also notes and explains any deviations from the assigned procedure. It concludes by describing general concepts applied to achieve the results and by making statements that extend beyond the scope of the exercise to the general case, (e.g., where the concepts or results could be applied outside of the lab exercise).