

**Rules and Principles Governing  
ASCS CIS 498 BAS Thesis  
Course Coordinator  
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**ASCC CIS 498 BAS Thesis  
Course Coordinator  
Prof. Chris Callison-Burch: [ccb@seas.upenn.edu](mailto:ccb@seas.upenn.edu)  
Spring Semester 2022**

Adapted from guidelines originated by Prof. Max Mintz

**Summary:** The purpose of the document is to delineate the requirements that must be satisfied to successfully complete the **ASCS/ASCC CIS 498 Senior BAS Capstone Thesis**. In addition to these stated requirements, this document also offers milestones and guidance on how to approach this process.

**Rules and Principles:**

1. The degree of mix between theory and application for this Thesis is, within reason, negotiable. The most important thing is that you find a suitable topic that meets the requirements stated below, and one that you are personally excited about. History shows that lack of enthusiasm on your part leads to degraded performance or even disaster. With a suitable and exciting topic, you are much more likely to work on it consistently throughout the term and not leave it all go to the end. Leaving it go to the end results, with high probability, in a disaster, i.e., failure to graduate for “May 2022” grads.
2. If you have not already developed a suitable and exciting proposal topic, you need to do this **now**. Ideally, the energy and insights needed to make this happen are generated internally. It is reasonable for us to expect that there are aspects of your educational experience in CIS and the wider world that define a set of possible topics. It is up to you to sell one of these ideas to a faculty adviser in CIS, or SEAS, or outside SEAS. The adviser implicitly promises to guide you where needed. The adviser will not drag you kicking and screaming to the finish line. Obviously, the adviser needs to be knowledgeable about the topic domain and be enthusiastic about the Thesis. **The student is responsible for fully informing the Thesis adviser about all CIS 498 course requirements and expectations.**
3. Since this is a CIS course, there should be a substantial substrate of CIS embedded in the resulting Thesis. The amount of CIS substrate is a judgment call that, if necessary, we will help you make. There is no requirement that you write programs as part of this Thesis. The Thesis could be an extensive literature review about some new CIS-related technology that you explore, and show its potential impact on the wider world. A literature review of this new technology must nonetheless **demonstrate that you have a deep understanding of the scientific and engineering basis for this technology**. A review that merely summarizes various sources without showing a deep integrated understanding of the technology will be deemed insufficient. A useful guide for **depth and breadth** appropriate to your Thesis may be found by looking at feature articles published in the **Communications of the ACM**. (Also, see below for “Grades”.)
4. The Thesis proposal should be about two single-spaced pages in length and include:
  - (i) your name and email address

- (ii) a short title and date
- (iii) your adviser(s) name(s) and email address(es)
- (iv) an abstract
- (v) an introduction
- (vi) a description of scope and depth
- (vii) a paragraph about why we should care about this
- (viii) expected outcomes
- (ix) a schedule (and see the course requirements below)
- (x) initial set of bibliographic references

**Please submit your proposal online via forms.cis.upenn.edu.** We will review all of these proposals. If there are required changes, the proposal will be returned for revision and re-submission, and iterated as needed. Once your proposal is approved, the department will register you for the course. Once you have been registered, all future course submissions will be via **Canvas**.

5. There are **six** major milestones for CIS 498:

- A. **The completed Thesis proposal must be submitted by 12 noon, Wednesday, 26 January 2022. A form without a Thesis adviser and their email contact information will be deemed incomplete. We will ask the listed advisor(s) for their approval.** The proposal will be counted towards the final course grade. As soon as possible after proposal submission we will respond with a decision of: Acceptable, Not Acceptable (why), or Needs Revisions (list).
- B. **A complete outline of your BAS Thesis, via Canvas, is due by 12 noon, Friday, February 18, 2022.** The outline should be based, of course, on the Thesis proposal, with any appropriate and requested updates. The outline should consider not just the **structure** of your Thesis, but **must also include a suitable topic sentence for each outline entry**. Include in the outline document: a title, your name, your advisor's name and email addresses for all. You may re-use as much of the original proposal material as you deem appropriate (the abstract, updated, e.g.).
- C. **You will schedule a 15 minute Zoom meeting between you, your Thesis advisor (if at all possible), and Prof. Badler (for ASCS) and/or Prof. Callison-Burch (for ASCC).** This is to ensure adequate communication, feedback, and agreement between all parties. These meetings should occur after the outline is submitted, during the period between **Monday, February 21 and Friday, February 25, 2022**. There may be approval, binding requirements, or helpful suggestions as a result of this meeting.
- D. **You are required to submit a mid-course draft of your Thesis via Canvas by noon on March 25, 2022.** This should be a single Word **doc** or **pdf** file documenting your Thesis progress. It should include and follow your (updated) outline and topic sentence materials, with roughly half of the text in a readable and thorough form. We would like to ensure that you are on track to timely completion. The ideal Thesis draft will have some material for all sections, **with the most complete being sections with technical depth**. An introduction can still be sketchy, as can the conclusions. A Thesis draft with only introductory material will not likely be as satisfactory. A Thesis based on an implementation should demonstrate that the implementation is essentially complete and what remains are testing and analysis. The document can have gaps, lack some illustrations, and require proofreading. **Failure to submit this mid-course draft will reduce your final grade by one full step** (A->B, B->C, etc).
- E. **You will schedule a 15 minute Zoom meeting between you, your Thesis advisor (if at**

**all possible), and Prof. Badler (for ASCS) and/or Prof. Callison-Burch (for ASCC).** This is to ensure adequate agreement on progress and remaining tasks between all parties. These meetings should occur between **Monday, March 28 and Friday, April 1, 2022.** There may be approval, binding requirements, or helpful suggestions as a result of this meeting.

- F. **The written final Thesis of at least 20 single-spaced pages must be submitted via Canvas by 12 noon, Wednesday, April 27, 2022.** Computer programs, tabulated data, extended bibliographies, acknowledgments, figures, and illustrations do not count towards the 20-page minimum requirement. The written report should be reviewed **first** by your Thesis adviser. The Thesis adviser will submit a recommended grade and any comments to us, but we will be solely responsible for determining the final grade. A late or incomplete report will receive a reduced grade.
6. When writing your Thesis keep in mind that your audience should be **Penn CIS Seniors with appropriate undergraduate background knowledge.** You are **not** writing to reach High School students, other Penn students, or your families. This helps you decide what fundamental knowledge you may assume and where you need to describe new material.
  7. Team Theses are **NOT** permitted.
  8. **SPECIAL NOTE FOR M&T BAS students.** You have an **additional** requirement of using your learnings from the Wharton School and doing a business/economic analysis (maximum 5 pages) of the Thesis topic. They should meet with Professor Sangeeta Vohra <[vohras@wharton.upenn.edu](mailto:vohras@wharton.upenn.edu)> for the required expectations which can vary depending on the proposal content.
  9. **Grades:** There is no default grade nor expectation that mere compliance with these formal guidelines will result in “A” grades. In general, we expect your Thesis topic to cover areas not addressed directly in your CIS and related coursework, show integration of these CIS ideas into a relevant area of societal interest or context, and provide both the broad context of why this topic is important as well as some recognized depth in exploring these connections. Depth can be achieved in a number of ways. Some approaches are: explanations, evaluations, and trade-offs among core algorithms and their costs; novel and/or challenging applications that can exploit and benefit from new computer science techniques; and actual coding and/or experimental investigations involving real or plausible data sources and analytic tools. **Theses without appropriate depth are unlikely to receive “A” grades.**
10. **Other Requirements:**
- (a) You understand that the work you submit is your original work. Thus, proper citations to all of your sources must be included. Extensive quoted passages are not a substitute for well-analyzed, summarized, and abstracted content. Penn’s Academic Code of Integrity must be honored: <https://catalog.upenn.edu/pennbook/code-of-academic-integrity/> (See further discussion below.)
  - (b) You may include and, if necessary, modify appropriate illustrations from other published materials. You should clearly cite these sources in your Bibliography. You should add your own captions and figure numbering. Any purpose, relevance, and content of an illustration should be discussed in your text. Figures are welcome, but they do not count in your 20 page minimum length, as noted above.
  - (c) A similar remark applies to mathematical formulas copied from other sources. If included, you should explain what the variables or parameters are, what the expression means, perhaps how such an expression is algorithmically or empirically evaluated, and what the relevant units are. Gratuitous math is not a substitute for deep understanding.

- (d) Since your work, in its entirety, could be subject to dissemination to the faculty and students in CIS and SEAS, the application of any **non-disclosure agreement is completely prohibited**.
- (e) According to Penn Intellectual Property rules, you own your own work. However, this also makes you responsible for respecting any copyright interests of others (e.g., with respect to “borrowed” illustrations) should you seek to publish all or part of your Thesis on your own. Selected Theses may be candidates for posting to the CIS498 example website. We will only post your Thesis there with your written permission.
- (f) It is also understood that the academic work leading to this Thesis was undertaken solely for CIS 498 in Spring 2022, and was not derivative of other papers or work you produced for or in conjunction with other courses, academic programs, or outside employment, e.g., paid or unpaid internships. In case of any doubts, please check with us and provide evidence for the background material and how your CIS 498 Thesis will go well beyond it.

11. **Exemplary Work in CIS 498:** Prior recent examples of exemplary CIS 498 Senior Capstone Theses can be found on the CIS Department’s website at: <http://www.cis.upenn.edu/current-students/undergraduate/courses/index.php>

12. **Academic Integrity:** We work closely with the Office of Student Conduct to ensure that your writing conforms to Penn's Code of Academic Integrity. Accordingly, early in the Spring term we will hold a one hour Workshop on accessing and using available resources, producing plagiarism-free writing, and interpreting TurnItIn software reports. We will also be providing you with reference material to help you read and write computer science prose. We know you can code, but the experience of writing a technical expository document may be quite novel for many of you.

Here are some pointers toward producing a manuscript that reflects your own thinking and expression.

\* When you read a paper, take notes but try to avoid cut-and-paste. It will be better to digest what you have read and summarize it in full sentences. This is not the same as "jotting down notes". You want to remind yourself why this work is (or isn't) important to your topic. You want to connect some important parts into your Thesis themes; these may be a bit different from the paper's original intent.

\* If you do copy useful quotes, pseudo-code, or code fragments, keep track of source page numbers. If you copy figures (which is OK), be sure you write your own version of the captions. In general, no direct quotation should be longer than a sentence or two and should somehow be crucial in its way of expressing a concept. Quotations longer than three printed lines should be indented and the source clearly cited; but better yet, try to avoid them at all!

\* Citations are critical components of technical writing. You should include all sources, but avoid “throwing in” extras. If possible, use primary sources rather than reportage or news feeds. Of course, many observations, summaries, and opinions will come through such secondary (usually Internet) sources, and can be used as appropriate. In such cases, it can be useful for you to state clearly why such a source is meaningful, contributory, and truthful. For Internet sources it is customary to give (at least) the URL and the date you accessed it. You may follow the ACM bibliography format: (<https://www.acm.org/publications/authors/reference-formatting>), though any other major academic format (such as APA) is acceptable.

\* Your advisor plays at least three critical roles in your Thesis: (1) suggest, evaluate, and even challenge your assertions in the content field you have chosen; (2) help you reach the necessary algorithmic depth required in the Thesis; and (3) guide you to, evaluate your use of, and help you interpret your citations. This intellectual mentorship is a great asset during the learning experience that is your capstone. Ultimately, your advisor should be your guide to the recognized experts, their publications, the relevant and significant technologies, and the wider societal issues you address. It is your role to synthesize all this into a coherent, well-structured, and grammatical exposition. We will write to all advisors to be sure that they understand their role as well.

\* To avoid any plagiarism issues before they arise, all Thesis drafts submitted must be run through TurnItIn. Canvas will do this automatically when you submit via Canvas. Note that you may submit multiple drafts prior to the deadline, in order to clean up any significant reported issues. In general, the last version submitted before the deadline is the one that will be deemed gradable.

\* The same requirement applies to your final Thesis submission. Submitted final Theses must be submitted through Canvas and will be scanned by TurnItIn. You will receive the TurnItIn report as well, so you can resolve any issues as needed. You may submit multiple times up to the deadline in order to address any significant detected problems. If for any reason you dispute any part of the TurnItIn report on your ultimate submission, please email Dr. Badler documenting your response.