Honors in Mathematics and Honors in Computer Science

Revised August 23, 2023

The Department of Mathematics and Computer Science grants honors to graduating students with outstanding records of accomplishment in mathematics or computer science, as demonstrated in three areas: breadth of curriculum, quality of academic performance, and significance of scholarly project. Candidates must complete a specified selection of courses, satisfy two GPA requirements, and undertake advanced work supervised by a faculty member. This culminates in a thesis successfully defended before a departmental thesis committee. This document provides details concerning requirements and procedures, and any exception to them must be approved by the department.

What is an Honors Thesis?

An honors thesis develops a specific topic in mathematics or computer science. Appropriate topics may grow out of coursework, summer or other research experiences, suggestions from faculty members, or journal or conference articles. The honors topic is normally refined by advanced work with the honors supervisor during one or more independent study courses. The thesis may contain original results or be mainly expository, so long as the thesis contributes a unique perspective not found within a single source, and is more extensive than a typical course project. An honors thesis introduces its topic at a level suited to the student's peers and presents its material with clarity, substantial background and thoroughness. Justifications of results proceed from the level of relevant Davidson courses. Results or theorems used but not justified or proved should be accompanied by citations to sources in the literature with justification or proof. In some cases, the length of the thesis approaches that of a small monograph; theses with new, significant results or theorems and proofs may be more compact. Copies of past honors theses may be examined in, but not removed from, the workroom across from the departmental assistant's office.

Requirements

A candidate for honors in mathematics or computer science must be a declared major in the same field. Candidates for honors in mathematics may emphasize either pure or applied mathematics.

Honors Field	The candidate must complete:
Computer Science	● MAT 150, ● two major-eligible electives in the Applications category, ● two major-eligible electives in the Systems category, ● one major-eligible elective in the Theory category, and ● one major-eligible elective in either the Theory or Other category.
Mathematics (applied)	● MAT 210, MAT 235, and MAT 315, ● one of the following two-course sequences: MAT 340 & MAT 341, MAT 320 & MAT 325, or MAT 330 & MAT 331, and ● one 400-level major-eligible course that is not an independent study (except by approval).
Mathematics (pure)	● MAT 330 and MAT 355, ● one of MAT 320 or MAT 325, ● two of MAT 331, MAT 340 and MAT 360, and ● one 400-level major-eligible course that is not an independent study (except by approval).

A number of courses are required for candidacy in honors in either mathematics or computer science. These are in addition to independent study courses undertaken with the honors thesis supervisor for the

honors project itself. These requirements are listed in the table above, but please refer to the Course Catalog for confirmation of current requirements.

As some CSC and MAT courses may fulfill requirements in multiple degrees, students may choose how to have each course count towards the degree requirements. For example, a CSC course may count towards a MAT degree or vice versa. How courses are designated for degree requirements does not affect how they fulfill the honors requirements. For example, a student seeking honors in computer science and a math minor could fulfill their math requirement in the CSC major with MAT 150, and their five electives in the CSC major with two Applications courses, two Systems courses, and one Other course. They would then have only one remaining course requirement for honors, in the Theory category, and that student might well choose a course that also counted in their Math minor, such as CSC 324. While this course could not count towards the CSC major–only one course may be shared between a major and a minor and MAT 150 is already filling that slot–it can still be used to satisfy the Theory requirement for honors in computer science.

A candidate for honors must attain an overall grade point average of at least 3.2, as well as a grade point average of at least 3.5 on all courses that either fulfill a major requirement in this subject, or a course requirement for honors.

All candidates must prepare an honors thesis and defend it orally before their thesis committee. The final recommendation of the department for graduation with honors is determined by the quality of the candidate's complete academic record, thesis, and defense. Additionally, the department may choose to confer high honors upon a candidate who displays unusual independence and initiative, develops original results, and clearly and rigorously communicates these via a high-quality thesis and oral defense.

A student interested in pursuing honors should notify their academic advisor during the spring semester of the sophomore year, or as soon as possible thereafter. During the junior year, such a student should identify an area for exploration and seek out a member of the department to serve as a potential honors supervisor. Formal declaration of pursuit of honors is recommended by the end of the advising period in the spring of the junior year and is due by the end of the first week of classes of the senior year.

Procedures

In what follows, observe that while absolute deadlines are specified, early completion is recommended. It is possible to complete the process even before the end of the fall semester of the senior year.

Declaration of Pursuit of Honors

The Declaration of Pursuit of Honors affirms the agreement and commitment of the student and faculty supervisor to develop an expository or research project within a specific area of mathematics or computer science. The typed declaration, a form for which is included in this document, includes the names of the student and faculty supervisor, the field of emphasis, the area of study, a paragraph describing the potential project(s) to be developed, a list of all MAT/CSC courses counting toward the major or the honors requirement either planned or completed, the final grade earned in each completed course in this list, and the grade point average on those courses. This declaration must be approved by the supervisor and submitted to the department chair no later than the end of the first week of classes of the fall semester of the senior year, and its submission is recommended by the end of the advising period of the spring of the junior year. After the submission of the Declaration of Pursuit of Honors, and with the consent of the department, the chair assigns a faculty member other than the honors supervisor to be the second reader. The chair also convenes a thesis committee at this time, comprising two to four additional faculty members. These assignments are made by the end of October of the senior year.

Approval of Candidacy for Honors

Students become official candidates for honors after presenting an outline of the thesis and demonstrating the proficiency to develop this outline fully. Candidacy occurs only upon approval by the supervisor and second reader and can be granted no later than the end of the first week of classes of the spring of the senior year. To obtain such approval, the student must schedule one or, at the discretion of the supervisor and second reader, more meetings with the supervisor and second reader, to answer questions on the chosen area of study and to discuss the outline or plan for the thesis. It is recommended that these meetings occur before the end of the fall semester of the senior year, and they may certainly take place earlier. After these meetings are completed, the supervisor and second reader discuss the student's candidacy. If approval is granted, the supervisor and second reader submit a jointly written Approval of Candidacy for Honors to the department, along with a brief report to the student and department members. The chair then consults with the candidate and the department before the end of January and schedules a date for the oral defense of the thesis no later than the last day of classes of the senior year.

Submission of Thesis

The first draft of the thesis must be a complete draft and submitted to the supervisor and second reader no later than six weeks before the date of the thesis defense. The second draft must moreover be accurate and thorough, ready for detailed evaluation by the second reader, and submitted to the supervisor and second reader no later than four weeks before the date of the thesis defense. The finished thesis, with hard copies delivered to each member of the department, must be submitted no later than two weeks before the date of the thesis defense.

Deposit of Thesis

Three unbound copies of the thesis, for the department, the supervisor, and the student, must be delivered to the chair no later than 24 hours after the last senior exam period of the senior year, together with a mailing address of the candidate after graduation. The department sends out these copies for formal binding, and sends the student's bound copy to the given mailing address. The student must also submit the thesis to the digital repository maintained by the library (see libraries.davidson.edu/archives).

Withdrawal

If at any step, the student or supervisor determines that it is best not to continue pursuing honors, the chair is notified. If the student is enrolled in an independent study course related to the project, the supervisor may adapt the ongoing project to fit expectations for an independent study course unrelated to honors.

Summary of Deadlines

All deadlines refer to the student's senior year.

1. End of first week of classes

Declaration of Pursuit of Honors submitted by student and supervisor to chair. The department suggests that this declaration be submitted by the end of the advising period in the spring of the junior year.

2. End of October

Second reader and thesis committee assigned by chair.

3. End of first week of classes of spring semester

Approval of Candidacy for Honors submitted by the supervisor and second reader to the department, together with a brief report to the student and the department.

4. Six weeks before the date of the thesis defense

First draft of thesis submitted by the candidate to supervisor with a copy to the second reader. This draft reflects the scope of the finished product. Additionally, the student works with their thesis committee to schedule a time and place for their defense.

5. Four weeks before the date of the thesis defense

Second draft of thesis submitted by the candidate to supervisor and second reader. This draft is accurate, thorough, and ready for detailed evaluation by the second reader.

6. Two weeks before the date of the thesis defense

Hard copies of the finished thesis submitted by the candidate to all thesis committee members.

7. Last day of classes of the spring semester

Thesis defense held.

8. Twenty-four hours after the end of the last senior exam period

Three unbound copies of thesis, together with mailing address, delivered by candidate to chair. Electronic version uploaded to the thesis archive at the library.

Further Details

What is involved in preparing and submitting a thesis?

The procedures outlined above pace students to be ready to submit a complete and accurate thesis to the faculty in a timely manner. Submitting to the committee should be considered similar to sending the manuscript to a potential publisher: the author, with assistance from the supervisor and second reader, should have carefully proofread the document to the point of considering it ready for a thorough and objective evaluation. Some corrections and recommendations are to be expected, and for successful honors theses, these have generally been few and minor. These should be incorporated into the final document submitted to the Chair for the college archives. The department suggests double-spacing and two-sided printing; observe, however, that doing so requires a wide margin on alternate pages for binding purposes. It is recommended and assumed that the thesis will be written with the LaTeX typesetting system. Past theses serve as models for formatting the opening pages, and LaTeX thesis templates are available from the department. When turning in final hard copies, a mailing address needs to be supplied for the student's copy. When uploading the final version to the library, an abstract and a few descriptive subject terms are required.

Students may ask the Chair to authorize the use of the Bernard Society account number to pay for standard copying of the thesis at the Copy/Print Center in the Union. Limited color copying is possible for a few special diagrams or images, when necessary.

Before the defense, what presentations are possible?

Honors candidates are encouraged to present their work in the department's Math/CS Coffee series and at one or more conferences. A Math/CS Coffee offers the candidate the opportunity to address Davidson students in a full period, as opposed to the briefer defense presentation presented primarily to faculty. Professional or undergraduate conferences offer the opportunity to speak to a regional or national audience. In mathematics, an annual conference that fits well with the usual thesis progression is the southeastern sectional meeting of the MAA, which usually takes place in March, with the submission deadline usually between mid-January and mid-February; Davidson faculty and students have traditionally been very active at this meeting. An earlier and larger annual mathematics conference is the Joint Mathematics Meetings, usually held during the first half of January. Specialized and regional conferences may also be appropriate and may offer the opportunity to speak to an audience more familiar with the topic. Such conferences may be suggested by the supervisor or be announced in the department's newsletter or on bulletin boards.

What is a defense?

An honors defense is an oral presentation and question-and-answer session with members of the candidate's thesis committee, followed by faculty deliberation. The candidate first introduces and develops portions of the thesis at a level directed toward faculty members for 20-40 minutes. The candidate may invite others to join the audience for this presentation. At the candidate's and supervisor's discretion, the chair may announce the event to all Bernard Society members. At the conclusion of the presentation, any such guests are excused from the remainder of the process. Thesis committee members then pose questions and requests for further elaboration to the candidate, and the question-and-answer session generally lasts 20-40 minutes. At the conclusion of this session, the candidate is excused and committee deliberation begins. The faculty either recommend an honors designation for graduation, contingent upon the candidate's meeting the GPA requirements and submitting the archival final copies and any further stipulations as deemed necessary, or decline to recommend such a designation. The entire process of an honors defense rarely exceeds ninety minutes.

Declaration of Pursuit of Honors in Computer Science
Department of Mathematics and Computer Science

Student Name: _____

Major: Computer Science Second major or minor (if any): _____

Faculty Supervisor: _____

Subject area within the selected field: _____

Please attach a paragraph describing the potential project to be developed into a thesis.

List all courses (by number and title) counting either toward the major, or toward honors candidacy. Include completed courses, ones in progress, and ones planned for future terms. Report grade points for each completed course in the penultimate column. The last column must note two courses in Applications, two in Systems, one in Theory, and one more in Theory or Other, but no additional CSC courses in these categories.

Requirement	Major?	Course	Term	Grade	Grade points	Category
Math 140, 150, or 160	Y					
Discrete Structures	Y	CSC 220				
Data Structures	Y	CSC 221				
Computer Organization	Y	CSC 250				
Analysis of Algorithms	Y	CSC 321				
Major Elective: Applications	Y					Applications
Major Elective: Systems	Y					Systems
Major Elective	Y					
Major Elective	Y					
Major Elective	Y					
Honors Elective	N					
Honors Elective (if needed)	N					
Honors Elective (if needed)	N					
Honors Elective (if needed)	N					

Overall Davidson GPA at the present time (3.2 required now and at graduation): _____

GPA on completed courses in this table (3.5 required at graduation): _____

Attach an explanation of any required courses taken outside of Davidson, or where a substitution is proposed. Any proposed exception must be approved by the department.

Student Signature _____ Date _____

Supervisor Signature _____ Date _____

Declaration of Pursuit of Honors: Mathematics
Applied Mathematics Track
Department of Mathematics and Computer Science

Student Name: _____

Major: Mathematics Second major or minor (if any): _____

Faculty Supervisor: _____

Subject area within the selected field: _____

Please attach a paragraph describing the potential project to be developed into a thesis.

List all courses (by number and title) counting either toward the major, or toward honors candidacy. Include completed courses, ones in progress, and ones planned for future terms. Report grade points for each completed course in the last column.

Requirement	Major?	Course	Term	Grade	Grade points
Calculus II	Y	MAT 113			
Math 140 or 160	Y				
Linear Algebra	Y	MAT 150			
Math 220, 230, or 255	Y				
Mathematical Modeling		MAT 210			
Differential Equations		MAT 235			
Numerical Analysis	Y	MAT 315			
1st of two-course sequence					
2nd of two-course sequence					
400-level course					
Elective					
Elective (if needed)					
Elective (if needed)					

Overall Davidson GPA at the present time (3.2 required now and at graduation): _____

GPA on completed courses in this table (3.5 required at graduation): _____

Attach an explanation of any required courses taken outside of Davidson, or where a substitution is proposed. Any proposed exception must be approved by the department.

Student Signature _____ Date _____

Supervisor Signature _____ Date _____

Declaration of Pursuit of Honors: Mathematics
Pure Mathematics Track
Department of Mathematics and Computer Science

Student Name: _____

Major: Mathematics Second major or minor (if any): _____

Faculty Supervisor: _____

Subject area within the selected field: _____

Please attach a paragraph describing the potential project to be developed into a thesis.

List all courses (by number and title) counting either toward the major, or toward honors candidacy. Include completed courses, ones in progress, and ones planned for future terms. Report grade points for each completed course in the last column.

Requirement	Major?	Course	Term	Grade	Grade points
Calculus II	Y	MAT 113			
Math 140 or 160	Y				
Linear Algebra	Y	MAT 150			
Math 220, 230, or 255	Y				
Real Analysis	Y	MAT 330			
Abstract Algebra	Y	MAT 355			
Math 320 or 325					
Math 331, 340, or 360					
Math 331, 340, or 360					
400-level course					
Elective					
Elective (if needed)					
Elective (if needed)					

Overall Davidson GPA at the present time (3.2 required now and at graduation): _____

GPA on completed courses in this table (3.5 required at graduation): _____

Attach an explanation of any required courses taken outside of Davidson, or where a substitution is proposed. Any proposed exception must be approved by the department.

Student Signature _____ Date _____

Supervisor Signature _____ Date _____