Student Handbook

Computational Linguistics
Master's Degree Program

(Two-Year MS, 5th Year BA/MS)

Brandeis University
2018-19

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CONTACT INFORMATION

Computer Science Department Office — Volen 261, compsci@brandeis.edu

Phone: (781) 736-2700   Fax (shared): (781) 736-2741

Mailing Address for COSI Dept. Office, Faculty, Staff, and Graduate Students

Department of Computer Science, MS 018 Brandeis University
415 South Street
Waltham, MA 02453 USA

Mail sent to you at this address will be placed in your box in the Department Office for you to pick up.

Volen Building Main Office — Volen 206

Once you have a Brandeis ID card, it is this office that adds to your card the ability to access the Volen building, doors within Volen, and the Vertica Lounge during off-hours when locked.

Staff

Position	Office	Email	Phone or Web site
Department Administrator: Michael Golitsyn	Volen 261	golitsyn@brandeis.edu	(781) 736-2701
Graduate Program Coordinator: Anne Gudaitis	Volen 261	gudaitis@brandeis.edu	(781) 736-2723
Department Coordinator: Justin Penney	Volen 261	jpenney@brandeis.edu	(781) 736-2700
Chief Systems Administrator: Chris Allison	Volen 125	chris@cs.brandeis.edu	(781) 736-2740
Systems/Gurus Info, FAQs		guru@cs.brandeis.edu	http://pages.cs.brandeis.edu/~guru/

Faculty for Courses Taken in CL Program (alphabetical by last name)

Faculty Member	Office	Email	Phone
Peter Anick	TBA	panick@brandeis.edu	TBA
Antonella Di Lillo	Volen 137	dilant@cs.brandeis.edu	(781) 736-2736
Lotus Goldberg, Advising Chair	Volen 252	lmgold@brandeis.edu	(781) 736-3265
Tim Hickey	Volen 138	tjhickey@brandeis.edu	(781) 736-2706
Sophia Malamud	Volen 215	smalamud@brandeis.edu	(781) 736-2225
Marie Meteer, Industry Liaison	Volen 139	mmeteer@brandeis.edu	(781) 736-2712
Olga Papaemmanouil	Volen 214	olga@cs.brandeis.edu	(781) 736-2716
Keith Plaster	Volen 124	kplaster@brandeis.edu	(781) 736-2726
Jordan Pollack, CS Dept Chair	Volen 213	pollack@brandeis.edu	(781) 736-2713
James Pustejovsky, CL MS Chair	Volen 258	jamesp@cs.brandeis.edu	(781) 736-2709
Pito Salas	Volen 134	pitosalas@brandeis.edu	(617) 388-6367
Jim Storer	Volen 254	storer@brandeis.edu	(781) 736-2714
Marc Verhagen	Volen 216	marc@cs.brandeis.edu	(781) 736-2769
Ben Wellner	Volen 139	wellner@cs.brandeis.edu	(781) 736-2712
Nianwen Bert Xue	Volen 253	xuen@brandeis.edu	(781) 736-2728

IMPORTANT BRANDEIS OFFICES AND WEBSITES

As a graduate student, you often use different campus offices than do Brandeis undergraduate students. For instance, Brandeis has an Office of Student Financial Services, and a program of Disabilities Services and Support (within the Academic Services office)—but these are used only by undergraduates. The same services for graduate students are provided instead through the GSAS office.

Additionally, the contact person in a given campus office (e.g. in the Registrar's Office) is sometimes different for graduate versus undergraduate students.

Generally, whatever you need that is not done by CL advising faculty or the COSI department office is very likely to involve either the GSAS office or the Registrar's Office (with the ISSO office added for international students). The websites for these two offices have a lot of information on them that is extremely helpful and relevant for you (though sometimes a bit difficult to find within each site!).

Especially noteworthy:

▶ The **Schedule of Classes** for individual semesters is found at the **Registrar's Office** website, under the 'Registration and Enrollment' link from the menu on the left. The Schedule of Classes lists the actual courses being offered (or, for previous terms, that were offered) in a given term, including their instructor, time slot, and (when available) room location.

Important:

• At the top of the Schedule of Classes page for any term, you can select the term (e.g. 'Fall 2018'), the course level (e.g. 'Undergraduate'), and the discipline (e.g. 'Computer Science'). Whenever searching for courses, we recommend always changing the course level from its default setting of 'Undergraduate' to 'All'.

The 'Undergraduate' setting will bring up only courses below 100-level (=1 to 99) and 100-level courses, *leaving out* graduate 200-level courses. CL MS students take courses in all three levels (below 100, 100-level, and 200-level), and selecting 'All' ensures that every course being offered that semester will appear.

• Courses like independent studies, theses, and internships will not appear on the Schedule of Classes unless you check the 'Include Independent Instructional Classes' box at the top of the page. The default is for this box NOT to be checked, so you need to check it in order to view these courses.

▶ The **University Bulletin**, which is the Brandeis course catalog, is found at the **Registrar's Office** website by selecting 'University Bulletin' from the menu on the left, and then choosing 'Current Bulletin' (or, for the following year yet to start, 'Provisional Bulletin'). The Bulletin does not have information specific to a given term, but instead lists all courses that a discipline offers in general, along with a complete description of the course.

Note:

• The information in the Bulletin about how frequently a course is offered (e.g. 'usually offered every second year') and sometimes about who the course's instructor is or its prerequisites (especially for CL as opposed to regular CS students) is sometimes not up to date. For more current information, you should check with the advisor and/or chair of the discipline in question for instructor and course

offering frequency; for the COSI and LING courses that comprise the CL MS curriculum, James and Lotus generally have the most up to date information about course offerings in upcoming terms.

When considering a computer science course for which you may lack certain COSI prerequisites, it's a good idea to check with the course's instructor and/or with James, Lotus, Bert, or Sophia—as often, particularly after the first semester or two as a CL MS student, you may in fact be able to take the course. The main take-home message is that prerequisite courses listed for a given course in the Schedule of Classes and/or Bulletin may not be absolute, especially for graduate (as opposed to undergraduate) students.

The Brandeis Graduate School of Arts and Sciences (GSAS) Office + Website

▶ Kutz 219 — (781) 736-3410 — http://www.brandeis.edu/gsas

This website has many helpful things for graduate students. Among them is the **Graduate Student Handbook**. This is full of useful information, and can be viewed online or downloaded as a PDF from the 'Teaching and Learning' link in the menu on the left of the main GSAS webpage.

General issues for Graduate Students handled by GSAS:

Admissions (including enrolling in Summer terms)
Financial aid, fellowships, student loans, other funding issues (including health insurance) Tuition payments and amounts
Academic standing issues (including Leaves of Absence and withdrawing from the University) Part- vs. Full-Time student status
Teaching Fellow information
Career services, including some assistance with searches for non-academic jobs University degree requirements (including Residency Requirements)
Graduation procedures, including filing petitions to graduate and ordering gowns for commencement Thesis submission procedures

The Brandeis Registrar's Office + Website

▶ Kutz 121 — (781) 736-2010 — http://www.brandeis.edu/registrar

General issues for Graduate Students handled by the Registrar's Office:

Course enrollment, including adding/dropping courses of all types
The Academic Calendar, including dates for the start and end of classes each term, for the final exam period, and for holidays
Deadlines for graduating—including deadlines for filing the relevant forms and depositing theses All other deadlines and date-related things
Forms for adding and dropping courses, and for giving permission of various sorts (GSAS also has some forms relevant to graduate students on its site)

Information Available from the Registrar's Office Website

In addition to the Schedule of Classes and University Bulletin described above, the Registrar's Office Website is the location for the Academic Calendar for each term, and for special dates relevant just to graduate students. For the former, see the '**Academic Calendar**' link on the Registrar's Office main webpage. From there, in the column on the right, click the particular term (e.g. 'Fall 2018') for the full

academic calendar for that term, or '**Additional Deadlines for Graduate Students 2018-2019**' for the current school year's graduate-student-specific dates. Many of these are essential for you to be aware of!

The Brandeis International Student and Scholars Office (ISSO)

▶ Kutz 215 — (781) 736-3480 — http://www.brandeis.edu/acserv/isso

International students should already be in touch with this office, but its contact details are included here, just to have handy. Deadlines involving visa and other issues for international students are often very rigid, and are set not by Brandeis, but by larger governmental agencies in this country. International students are thus advised to be especially on top of things, to apply for all necessary permissions well ahead of schedule, and so on.

An important additional note: international students who enroll in an internship on or off campus may be required to obtain Curricular Practical Training (CPT) authorization from the International Students and Scholars Office (ISSO) BEFORE beginning the internship. International students interested in completing an internship, whether for their Exit Requirement or just for elective credit, must email isso@brandeis.edu to schedule an appointment (in-person or via phone) with their ISSO advisor to determine if such authorization is required. For more information on internships (for the CL MS Exit Requirement and otherwise), please see the 'Exit Requirement' section below. For more information regarding CPT, please visit < http://www.brandeis.edu/isso/current/employment/cpt/>.

The Main Brandeis Website

http://www.brandeis.edu

Finding Contact Information for Brandeis Students, Faculty, and Staff

From the 'Popular Resources' link in the top left corner of the main Brandeis web page, select 'People Directory'. From here, you can search by name, email address, or Brandeis unet ID to find as much contact info as the system has for faculty, students (of all levels), and staff. This minimally includes an email address, and often also a phone number and campus location.

Brandeis Campus Maps

http://www.brandeis.edu/about/visiting/directions.html

Clicking 'interactive campus map' from this page will take you to a google map of campus. It is helpful to note that, after scrolling down to the bottom left corner of this page, you will also find links to PDFs of non-google maps which some find easier to interpret than the google map. One such PDF is in black and white and one in color, and both will print fairly well.

EMAIL LISTS FOR CL AND LINGUISTICS

Brandeis CL Email Lists

There are various email lists for the CL community at Brandeis, within the @lists.brandeis.edu domain. These include the following, and are managed by our office (and in traditionally by especially Anne Gudaitis)—who make sure the appropriate people are on the appropriate lists.

Email List	Appropriate Recipients
compling-all@lists.brandeis.edu	All CL MS + PhD students, postdocs, faculty, visitors
compling-ms-firstyr@....	Students in their first year in the CL MS Program— first year Two-Year students + 5th Year BA/MS Students
compling-ms-advanced@....	Students taking advanced courses in the CL MS Program— non-first-year Two-Year students + 5th Year BA/MS students

Once on a list, you login to lists.brandeis.edu with your Brandeis unet ID to change your settings for the list, including what email address receives emails posted to the list.

The Brandeis Linguistics Email List

ling@lists.brandeis.edu, also called the 'ling list', is an email list for general linguistics announcements at Brandeis. Most posts on this list are specifically for linguistics undergraduate students or courses, and this is the sole list for such postings—but announcements about new linguistics courses, conferences, and so on are also of interest to CL students.

To be put on this list, send an email to the office, including what email address you would like the list to use for you.

THE LOGISTICS OF CL MS COURSE REGISTRATION

Brandeis holds two registration periods for each semester. The first 'pre-registration' period typically runs for roughly one week during the second half of the preceding term: pre-registration for Fall is typically in April of the preceding Spring term, and pre-registration for Spring is typically in November of the preceding Fall term. The second is the regular registration period, typically starting a week or so before the first day of classes for a given term (though, for the first time, Fall registration this year opened in July), and running through that term's first couple of weeks.

As a graduate student, you should not have any trouble getting in to any course that you need for your degree.[1] This includes that you should still be able to enroll in and take any COSI or LING courses that are listed in SAGE and the online Schedule of Classes as already having reached their enrollment limit, and thus full. This is important to note, since it is likely different from your undergraduate experiences.

As described in the Course Selection section of this handbook, the course schedule for each student is tailored to the student's individual needs (in terms of computer science and/or linguistics background needed) and academic interests. In order to achieve this, we hold group and individual advising meetings with all new CL MS students before the first day of classes of the semester, and via office hours and appointments for returning students. For new students in the Program, these meetings follow the CL MS new student orientation meeting, where general course and advising information and guidelines are provided. Once the semester's course schedule has been decided, students can then formally register for courses in Sage any time through the last day of the regular registration period.

You can come to any courses you like on the first day of classes, regardless of whether or not you have formally added the courses in Sage. 'Shopping' for classes in this way is common and encouraged, and is helpful if you have any courses that you are not yet positive you want to take. It is optimal when possible to attend from the first day any course that you think you might end enrolling in, even if you're not sure— so that you don't miss any material or information you'll need for it later.

Important note #1:

- After the regular registration period for a semester ends (usually around the second week of September in Fall terms, and the 3rd or 4th week of January in Spring terms), it is NO LONGER possible to add a course. Thus, by the close of the regular registration period, you should be sure to have added in Sage all courses that you think there is a chance you will complete. You can *drop* them later, if need be, but it you cannot *add* them later.

- The deadline for graduate students to DROP courses in Sage extends much later into the term— typically coming in mid-November of Fall terms, and early April of Spring terms. Thus, any courses that you added in Sage during the registration period can be dropped (with the consent of CL advising faculty) up to this time.

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[1] Note though that courses taken outside of Computer Science or Linguistics—especially courses whose primary audience is undergraduate students—often do fill up during the pre-registration period held during the preceding term. This is especially true for language courses, especially at the introductory level (e.g. French 10 or Japanese 30). For these, it will be important to register for the course as early as possible during the term's <u>pre-registration</u> period, since the courses may well already be full by the end of the pre-registration period.

Important note #2:

- These add and drop deadlines for graduate students are adhered to very strictly by the Registrar's Office. They may not allow any exceptions (even if asked by CL faculty!), and it is thus very important for you to keep aware of these dates each semester. In particular: be sure that you can complete and do well in all courses remaining in your schedule on Sage beyond the last day for graduate students to drop courses. It may not be possible to drop them later, if troubles arise.

Courses Requiring Special Permission

The Registrar's Office requires that special permissions of various sorts be obtained for certain courses.

Courses requiring a form to be filed for enrollment in them

It has often been the case that certain courses cannot be added in Sage, but are instead added to your course schedule by handing in a form in person at the Registrar's Office. This has been less common in recent years, but sometimes still happens. Any course for which this is the case will appear in your Sage course schedule for the term once the Registrar's Office has processed the form you hand in. Courses added this way have the same deadlines for adding and dropping courses as regular courses added by using Sage directly. These forms should be printed from the Registrar's Office website's 'Forms' page—under the 'Graduate Registration' section of <www.brandeis.edu/registrar/forms>.

- Courses below 100-level have sometimes required that a 'Petition to Receive Graduate Credit' form be handed in by the student to the Registrar's Office. (Note that this includes most of the COSI courses taken by CL MS students for CS background, including e.g. COSI 11a, 12b, and 21a.) If this is the case this year, the form would require the signature of the course's instructor, as well as from the CL MS Chair or advising faculty (i.e. James, Lotus, Sophia, or Bert).

- Independent Instruction Courses like independent studies and the Thesis and Internship courses (see the 'Exit Requirement' section below for more on these) require that an Add/Drop form be handed in in person by you as the student to the Registrar's Office. Add/Drop forms too require signatures from the course's instructor, and from the CL MS Chair or advising faculty (i.e. James, Lotus, Sophia, or Bert).

Courses requiring a Consent Code for enrollment in them

Consent codes for courses are obtained from the course's instructor (and *not* from CL faculty/staff like James, Lotus, Sophia, or any CS Office staff, who have no access to these codes).

Most courses do not require a Consent Code to enroll in them. However, for certain courses, Sage will prompt you for a Consent Code. When this occurs, you should ask or email the course's instructor for a code (each code is unique, and only used once). You will then enter the Code in Sage, which will usually then allow you to make the desired change (e.g. adding the course), without filing any physical forms.

- Some courses (especially advanced CL and COSI courses, which may require several prerequisite courses) require a Consent Code of each student in order to add the course. This is so that the instructor can verify that every student who enrolls has the background needed to take the course.
- Adding or Dropping courses beyond certain dates can sometimes be done by the student in Sage using an instructor Consent Code, without having to file a physical Add/Drop form at the Registrar's Office. In the past, this was often not possible later into the term, and not possible at all for graduate students (even if still possible for undergraduate students), who were required to file an Add/Drop form so that the Registrar's Office can ensure that graduate student progress toward the degree is not hurt by dropping the course. Recently, it seems that Sage has been accepting Consent Codes from graduate students to drop courses, and so we expect (but are not yet certain) that this will

continue for this year.
- Courses whose enrollment limit has been reached or exceeded (as often occurs with foundational CS courses like COSI 11a, 12b, and 21a) can be added using an instructor Consent Code.

DEGREE REQUIREMENTS AND STATUS IN THE PROGRAM

The Department of Computer Science offers different Master's Degree programs, each with its own admissions criteria and degree requirements. Thus, although you may be in courses with other CS graduate (and undergraduate) students, the following requirements are only for the CL MS degree, and not for the other MS programs in Computer Science.

CL MS Degree Requirements

I. Course Requirements

The Two-Year CL MS degree requires 4 semesters of enrollment for full-time students, and full-time GSAS students must take a minimum of 3 courses per semester. Thus, a minimum of 12 courses are required for all Two-Year CL MS students, whether full-time or part-time.

Fifth Year BA/MS students must complete the same 12-course requirement to complete the CL MS, but will have taken some of these courses during their undergraduate studies. Since the MS year for BA/MS students requires 2 semesters of enrollment for full-time students, this means that a minimum of 6 courses must be taken during this fifth MS year.

There are 4 basic types of course (referred to below as Groups (A), (B), (C), and (D)) that will make up the 12 minimum courses taken by each CL MS student.

a. _Up to 6 Student-Specific Computer Science and Linguistics Background Courses_

These are required of students who have not had an equivalent course prior to entering. Whether or not a given student must take each of these will be determined during the advising meetings that take place preceding the first day of classes in students' first semester of the Program. Students entering with prior in-depth study of both computer science and generative/formal linguistics may not need any of these; at the other extreme, students entering with prior study of neither computer science nor formal linguistics would take all 6.[2]

LING 120b–Syntactic Theory (offered every Fall)
LING 130a–Formal Semantics (offered every Spring)
LING 160b–Mathematical Methods in Linguistics (offered every Fall)
COSI 11a–Programming in Java and C (offered in Fall only)
COSI 12b–Advanced Programming Techniques (offered in Fall & Spring)
COSI 21a–Data Structures and the Fundamentals of Computing (offered in Fall & Spring)

b. _6 CL Core Courses – Required for all students_

LING 131b–Intro to Natural Language Processing with Python (first year Fall core course)
COSI 114b–Fundamentals of CL (first year Spring core course)
COSI 134a–Statistical Approaches to NLP (second year Fall core course)
COSI 137b–Information Extraction (second year Spring core course)
COSI 138a–CL 2nd Year Seminar (taken in second year, Spring)
COSI 140b–Natural Language Annotation for Machine Learning (taken in first year, Spring)

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[2] Most courses taken in our program are offered in just one but not both of the Fall and Spring terms. Courses for which this is true show the term in which they are offered in parentheses.

c. *1 semester of any one of the three courses that satisfies the Exit Requirement –*
   Required for all students

   Required to satisfy the Program's Exit Requirement, and described in detail below, each student
   must complete at least one semester of one of these courses. (Students may also opt to complete
   more than one such courses—e.g. doing both Thesis and an Internship—and/or to complete any
   such courses over two semesters rather than one.)

d. *Up to 5 Required Elective Courses*

   The 6 CL Core Courses in (B) and 1 semester of an Exit Requirement Course in (C) serve as 7 of
   the 12 minimum courses required of all students in the Program. This leaves 5 course slots
   remaining.

   - If required to take 5 or more of the Student-Specific Background Courses in Group (A),
     students will automatically reach the 12 course minimum just in fulfilling their
     requirements for Groups (A), (B), and (C). For these students, no additional Elective
     Courses are *required*. (These students still can, of course, opt to take additional Electives,
     bringing their total courses taken above the 12 minimum.)

   - If required to take 4 or fewer Student-Specific courses from Group (A), students will
     complete their requirements from Groups (A), (B), and (C) *without* reaching the 12 course
     minimum. For such students, one or more Elective Courses are additionally required, so
     that the student reaches 12 total courses from across Groups (A) through (D). Thus, for
     instance, if 4 Group (A) Background Courses are required for a given student, then the
     student has a requirement of just 1 Elective Course; if 2 Group (A) Background Courses
     are required, then 3 Electives are needed; and so on.

   Elective Courses that count toward the degree can be any CL course, or—when a good match for
   student interests and goals, and with approval by the CL advising faculty—can be a well-chosen
   course from the straight linguistics or computer science curriculum.

II. *Residency Requirement*

   For full-time students, 4 semesters of enrollment are required for the Two-Year CL MS, and 2
   semesters for the Fifth Year CL MS. After the required number of terms of residency are completed,
   full-time students who need to enroll for one or more additional semesters (e.g. to complete remaining
   course requirements or the Exit Requirement) have an 'Extended Master's' enrollment status. This
   means that they are still allowed to enroll in courses just as an ordinary full-time student would, but
   pay substantially less in tuition fee amounts.

   There is no residency requirement for part-time students. Instead, the counterpart for part-time students
   involves completing the 12 courses minimum (along with all courses required for the degree) that
   corresponds to full-time students' minimum of 4 semesters of residency at 3 minimum courses per
   term.

III. *The CL MS Exit Requirement*

   In order to complete the CL MS degree, students are required to complete one of a Master's Thesis in
   CL (via the course COSI 299a–Computational Linguistics Master's Thesis), a CL Internship at a
   company (via the course COSI 293b–Computational Linguistics Research Internship), or a CL
   Capstone Project (via a course soon to be announced; stay tuned!). As mentioned above, each of

these counts as a regular course toward full-time enrollment (thus carrying the full 4 credits that ordinary courses have), and toward the minimum 12 courses needed to complete the degree.

The Exit Requirement is standardly done in the final semester in the Program. With the permission of CL advising faculty, students can opt for an Exit Requirement Thesis, Internship, or Capstone Project to span two semesters rather than one, and/or to complete more than one of these. For more information on both of these, please see the 'Exit Requirement' section of this Handbook.

Academic Progress and Status in the Program

Status in the Program is assessed as follows:

Good Standing: Courses have been taken as expected, no grade earned was below passing (i.e. below a B-, which is the lowest passing grade for all Brandeis GSAS students), and there is no more than 1 outstanding Incomplete

Delayed: Some courses were not taken as expected, and/or there is more than one outstanding Incomplete, but the student is otherwise in Good Standing

Cause for Concern: There is more than one B- grade in especially required courses, but no grades are below a B-

Probation: There is one or more non-passing grade (=grade below a B-).

More than one semester over the course of the degree in which coursework performance incurs Probation status risks the student being withdrawn from the Program.

At the end of each semester, students will be notified if their status is *other than* in Good Standing, and if so the reason for this status being assessed. Students whose coursework has been completed on schedule and with satisfactory grades, per the above criteria—so that they are in Good Standing—will not be notified.

COURSE SELECTION INFORMATION

Number of Courses Taken per Term

Full-time Two-Year students typically take roughly 4 courses per term in the first year, and roughly 3 courses per term in the second year. Fifth Year BA/MS students are treated on a par with second year Two-Year students, and thus also take roughly 3 courses per term.

The minimum number of courses per term that a graduate student can take to retain their status as a full-time student is 3. While there is no maximum number per term for full-time graduate students, it is typically not possible for graduate students to take and do well in more than 5 courses in a single semester. Depending on the nature of the courses involved and also on the individual student, 4 or even 3 can sometimes be the limit.

As elaborated further in the 'Guidelines and Process for Determining Each Semester's Course Schedule' below, the most important goal is to take enough courses to be challenged and learning as much as possible, while also making sure that the work is not so demanding that the student cannot maximally absorb and benefit from the courses they're in. It is important to keep this balance in focus as the central aim while shopping for classes, as the term proceeds, and at the deadline for graduate students to drop classes for the semester.

Since each course taken to satisfy the CL MS Exit Requirement counts as one course toward full-time enrollment, a student completing just a CL Internship (or just a CL MS Thesis or Capstone Project) for the Exit Requirement during the final semester would only need to take 2 additional regular courses that term. A student choosing two Exit Requirement options—e.g. completing both a CL Internship and Thesis—during the final term could have a schedule that term of just those 2 Exit Requirement courses plus 1 regular course.

Note that COSI 138a–CL Second Year Seminar is typically not included by CL advising faculty toward the 3 courses per term generally taken second/fifth year students. However, since it is a regular course within COSI course offerings, it *does* contribute to the number of courses taken by a student for the purposes of e.g. being considered a full-time student by the University.

Part-time students in the CL MS Program have the same degree requirements as full-time students, both in terms of the number and identity of courses taken overall. But part-time students take only 1 or 2 courses per term, and thus complete the degree over a longer period of time. The overall length of time to complete the degree part-time depends on how many courses the student takes each term, and whether or not the student opts to complete any courses during summer terms.

Sample Course Schedules

Though each student will work out their individual schedule with the CL advising faculty, the following templates can be useful to view for the two extremes in type of CL MS student: those who enter the Program without prior study of computer science (or math) beyond a small amount of programming experience, but with at least some study of linguistics—and those who come in lacking linguistics background, but with prior study of computer science.

*Note: Group B Core Courses obligatory for all students appear in **bold**.*

Sample Course Schedule — Students with Linguistics but not CS background

	Fall	Spring Semester
1st Yr / Under-grad	· **LING 131 Intro to NLP with Python** · LING 160 Math Methods in Linguistics · COSI 11 Programming in Java · (COSI 21a Data Structures) · (LING and/or COSI background course, or CL Intermediate-Level Elective(s))	· COSI 12 Adv. Programming Techniques and/or COSI 21a Data Structures · **COSI 114 Fundamentals of CL** · **COSI 140 Natural Lang Annotation for ML** · (LING and/or COSI background course, or CL Intermediate-Level Elective(s))
2nd Year / 5th Year	· COSI 21a Data Structures (if not taken during 1st year) · **COSI 134 Statistical Approaches to NLP** · COSI 136 Automated Speech Recognition · (CL, COSI, or LING Elective)	· **CL MS Exit Requirement Course** · **COSI 137 Information Extraction** · **COSI 138 CL 2nd Year Seminar** · CL, COSI, or LING elective

Sample Course Schedule — Students with CS but not Linguistics background

	Fall	Spring Semester
1st Yr / Under-grad	· LING 120 Syntactic Theory · **LING 131 Intro to NLP with Python** · CL, COSI, or LING Elective(s)	· LING 130 Formal Semantics · **COSI 114 Fundamentals of CL** · **COSI 140 Natural Lang Annotation for ML** · (LING 110 Phonological Theory / LING 140 Discourse and Pragmatics / or CL, COSI, or LING elective)
2nd Year / 5th Year	· **COSI 134 Statistical Approaches to NLP** · COSI 136 Automated Speech Recognition · CL, LING, or COSI Elective(s)	· **CL MS Exit Requirement Course** · **COSI 137 Information Extraction** · **COSI 138 CL 2nd Year Seminar** · CL Electives · (other CL, LING, or COSI elective)

Elective courses include the following, grouped by domain and level of study.

Additional LING foundational and relevant elective courses include:

LING 105a Phonetics (Fall 2018)
LING 110a Phonological Theory (Spring 2019) LING 115a Morphology (Spring 2019)
LING 121b Syntax II (next offered in 2019-20) LING 125b Linguistic Typology (Spring 2019)
LING 140a Architecture of Conversation: Discourse and Pragmatics (next offered in 2019-20)
LING 150a Historical Linguistics and Language Change (next offered in 2019-20)
LING 190b Topics in Linguistics: Phonology II (next offered in 2019-20)
LING 190b Topics in Linguistics: Fundamentals of Linguistic Research (Fall 2018)

Additional COSI foundational courses include:

COSI 29a Discrete Structures (Fall 2018)
COSI 121b Structure and Interpretation of Computer Programs (Spring 2019)
COSI 130a Introduction to the Theory of Computation (Spring 2019)
COSI 131a Operating Systems (Fall 2018)

COSI electives especially relevant for CL include:

COSI 101a Fundamentals of Artificial Intelligence (Spring 2019)
COSI 111a Topics in Computational Cognitive Science (next offering possibly in 2019-20)
COSI 113b Artificial Life (next offering probably in 2019-20)
COSI 118a Computer-Supported Cooperation (Fall 2018)
COSI 119a Autonomous Robotics Lab (Fall 2018)
COSI 123a Statistical Machine Learning (next offering probably in 2019-20)
COSI 126a Introduction to Data Mining (Fall 2019
COSI 125a Human-Computer Interaction (next offering possibly in 2019-20)
COSI 127b Database Management Systems (next offering probably in 2019-20)
COSI 129a Introduction to Big Data Analysis (Spring 2019)
COSI 165a Software Entrepreneurship (Fall 2019)
COSI 166b Capstone Project for Software Engineering (Fall 2019)

CL intermediate-level electives include:

(appropriate for both 1st & 2nd year students)

COSI 112a Modal, Temporal, and Spatial Logic for Language (Fall 2018) COSI 132a Information Retrieval (Spring 2019)
COSI 135b Computational Semantics (next offered 2019-20) COSI 233a Discourse and Dialog (probably next offered 2019-20)

CL advanced-level electives include:

(appropriate for all 2nd year students, & only those 1st years with significant programming background)

COSI 136a Automated Speech Recognition (Fall 2018)
COSI 139a Machine Translation (next offering possibly in 2019-20)
COSI 216a Topics in Natural Language Processing (next offering possibly in 2019-20)
COSI 217b Natural Language Processing Systems (Spring 2019)

Notes:

- Aside from COSI 136a–Automated Speech Recognition (which is offered every Fall) and COSI 132a– Information Retrieval (which is generally offered every Spring), CL elective courses tend to rotate each term and year, so that distinct courses are offered in each of the four terms that a full-time student would be enrolled. This is designed to allow students a variety of elective options over the course of their time in the Program.

- The additional courses COSI 216a–Topics in Natural Language Processing and COSI 217b– Natural Language Processing Systems are rotating-topic courses, and vary between intermediate-level and advanced-level material. These courses are often used to pilot new course topics before submitting them to be approved as regular courses. COSI 216a generally involves more theoretical/modeling-based topics, while 217b typically involves more applied topics. (Within linguistics offerings, LING 190– Topics in Linguistics is also generally used to pilot new course topics, some of which are relevant to CL students.)

- Students are welcome (and in fact encouraged) to undertake internships, with or without academic credit for the internship, prior to the point at which they are academically ready to satisfy the Exit Requirement. This typically begins during the summer following the first year, and sometimes continues into the second year. For non-international students, such internships are typically done without getting academic credit. International students, in contrast, must get course credit in order to be involved in such an internship, and in these cases should enroll in the course COSI 293g–Master's Research Internship, which counts for one-fourth of a full course (i.e. for 1 total credit).

Such cases do *not* count as satisfying the Exit Requirement for the CL MS degree, as there is a distinct course taken (namely COSI 293b–Computational Linguistics Research Internship) for the Exit Requirement. Please see the 'Exit Requirement' section below for more information.[3]

Guidelines and Process for Determining Each Semester's Course Schedule

As mentioned above, the aim in selecting courses, for every semester in the Program, is for the student to be enrolled in enough content that they are feeling pushed and challenged, but not so much that they cannot fully benefit from and absorb the material.

▶ Therefore, it is often ideal to begin the semester enrolled in at least one course that need not be completed, and could be dropped later on with the student remaining in Good Standing. In some semesters—and especially for Two-Year students in the first term of the Program, and in their first year in general—this may even be two courses.

The reasoning for this includes the fact that, each semester, the drop deadline for graduate students is extremely late (e.g. not until November 14 for the Fall 2018 term), and, further, that there is no indication of having begun but subsequently withdrawn from a course for graduate students (so that there is no equivalent of a W on the transcript, as occurs for undergraduate students).

In contrast, it is not possible to add a course once the semester is underway, if a student has not already been attending and doing work for it. Thus, it is possible to drop a course during the semester, if it or the overall course load has become too challenging—but not possible to add an additional course, if it has become clear that the course load is not challenging enough. And, particularly for a graduate student, it is extremely important not to fail

It is for this reason that 'shopping' courses at the start of the semester is encouraged. In this way, students will generally begin the semester with a list of courses to attend from the first day, with it clear which will definitely be taken (e.g. because they are required for all CL MS students, or for the particular student) and which are just being considered.

This is even more the case for Two-Year, Full-Time students in their first semester of the program, since, for them, it is often also still being worked out which Student-Specific Background Courses the student needs to take. Taking more or fewer Student-Specific Courses in a term will affect the number of electives

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[3] Very importantly, as mentioned above and below, international students who enroll in an internship on or off campus may be required to obtain Curricular Practical Training (CPT) authorization from the International Students and Scholars Office (ISSO) BEFORE beginning the internship. International students interested in completing an internship, whether for their Exit Requirement or just for elective credit, must email isso@brandeis.edu to schedule an appointment (in-person or via phone) with their ISSO advisor to determine if such authorization is required. For more information regarding CPT, please visit: <http://www.brandeis.edu/isso/current/employment/cpt/>.

also taken that term.

For new students in the Program, then, a major purpose of the group advising sessions held in the afternoon right after orientation, as well as of the individual advising meetings that occur after Orientation and before the first day of classes, is for the student to emerge from all of these with a list of courses to attend from the first day—with it clear which will definitely be taken, which are just being shopped, and so on. Part of this should involve a prioritizing of the course list, so that it is also clear what would be the first or second course to drop once the semester is underway, if things become too challenging.

After the first week or so of the semester, and after checking back in with CL advising faculty if needed, students will generally have settled on a final list of classes in which they will enroll, and for which they will (at least) begin the semester doing work. In the first semester in the Program, for both Two-Year and Fifth Year students, it is often not until this point that students finalize their official course schedule in their online SAGE account.

After the first semester in the Program, students will have registered for some initial list of courses during the pre-registration period for that term that occurred within the preceding semester. For these students, it is at this point that courses may be added to or dropped from that list of enrolled courses in SAGE. All SAGE changes that involve adding a course must be completed before the end of the regular registration period for the term (e.g., for Fall 2018, by September 14).

As each course proceeds, and especially as its introductory phases are completed and midterm work approaches, it often becomes clear that certain courses not absolutely required for the particular semester might ideally be dropped, to allow for the rest of the semester to proceed for the student in the best way possible. The typical reasons for a student deciding to drop a course at this point are either because they are in danger of getting a non-passing grade below a B-, or (more often) that what would be required to get a passing grade would take so much additional work that it would not allow the student to engage or learn as fully from their remaining courses, and especially their core and other required courses that term.

Students should keep this in mind, feeling free to consult with CL advising faculty as needed, and keeping aware of the absolute deadline that term for graduate students to drop courses (e.g. November 14, for semester courses in the Fall 2018 term).

THE EXIT REQUIREMENT: A THESIS OR INTERNSHIP

Important:

As mentioned above, the '**Key Degree Dates for Graduate Students**' list is separate from the general Brandeis Academic Calendar, and includes specific graduation deadlines (including those for Master's theses) just for graduate students. Thus, you should find this page and keep its dates handy as your final year begins, and as it progresses. From the 'Academic Calendar' at the Registrar's Office main webpage, the dates can be accessed each year from the column on the right, under the link 'Additional Deadlines for Graduate Students 2018-2019' (with the year varying as appropriate).

As the final requirement towards graduation, students are required to complete either a Thesis, Internship, or Capstone Project in CL, lasting at least one semester. To allow students to use the knowledge and skills acquired throughout their studies, with the Exit Requirement serving as the culmination of study in the Program, it is standard for this requirement to be done in the final semester: this is normally in Spring of the second year for full-time Two-Year students, or Spring of the fifth year for BA/MS students.

With the permission of the CL advising faculty, students can choose to complete more than one of the three Exit Requirement options, and/or for either or both to occur over two semesters, rather than one. This would still be done at the end of the degree, and thus generally in Fall and Spring of the second year (for Two-Year students) or the fifth year (for BA/MS students).

All three of the Exit Requirement courses to register for are 'independent instruction' courses, and so only show up when searching the COSI Schedule of Classes page for a particular term by checking the 'Include Independent Instructional Classes' box at the top of the page, and making sure that 'Graduate' or 'All' (and not 'Undergraduate') are selected from the menus at the top of the page. (See the note on this in the Schedule of Classes section above, under 'Important Brandeis Offices + Websites for CL MS Students'.)

Completing a Computational Linguistics Internship

Students opting to complete an Internship for their Exit Requirement must enroll in the course COSI 293b–Computational Linguistics Research Internship. This involves registering for an individual section taught by one of the CL faculty—often Marie, James, or Bert. This faculty member will keep in contact with the student's supervisor at the company, and will determine and enter a grade for the student's performance at in the Internship course accordingly. If there is no section of the course listed for the term in which you are completing it with the particular professor you'll use, contact the office (compsci@brandeis.edu) to have an additional section added with that professor.

The amount of time spent each week varies by company for a particular Internship, but is usually at least 15 hours per week in order for the company to feel it worth their while to train the intern, and typically somewhere between 15-20 hours per week.

The Internship is considered finished—and thus the Exit Requirement satisfied—when, at the end of the term, the Brandeis instructor supervising the Internship receives feedback from the supervisor at the company that the work was completed in a way that corresponds to the standard Brandeis passing grades for graduate students (i.e. of B- or better). The Brandeis instructor will keep in touch throughout the term with the supervisor at the company, so that the student will have a sense as the term proceeds that the work being done is indeed satisfactory.

Note (repeated from above):

Students are welcome and encouraged to undertake internships (with or without academic credit for the Internship) prior to the point at which they are academically ready to satisfy the Exit Requirement. For international students who must get course credit in order to be involved in such an internship, the course COSI 293g–Master's Research Internship is typically used in this case. However, such cases would *not* count as satisfying the Exit Requirement for the degree (and, accordingly, students would not in these cases enroll in COSI 293b–Computational Linguistics Research Internship, which is used just to fulfill the Exit Requirement).

<u>EXTREMELY Important Note</u> for International Students:

As mentioned above, international students who enroll in an internship on or off campus may be required to obtain Curricular Practical Training (CPT) authorization from the International Students and Scholars Office (ISSO) BEFORE beginning the internship. International students interested in completing an internship, whether for their Exit Requirement or just for elective credit, must email isso@brandeis.edu to schedule an appointment (in-person or via phone) with their ISSO advisor to determine if such authorization is required. For more information regarding CPT, please visit:

<http://www.brandeis.edu/isso/current/employment/cpt/>.

Completing a Computational Linguistics Master's Thesis

To complete a Thesis, students must enroll in the 'independent instruction' course COSI 299–Computational Linguistics Master's Thesis. This involves (analogously to the Exit Requirement Internship course COSI 293b) registering for an individual section taught by one of the CL faculty—in this case, whatever faculty member is supervising the Thesis.

Students interested in completing a Thesis should be in touch with the faculty member with whom they would like to work, ideally during the term before the Thesis will be done—and, at the very latest, by the start of term in which the Thesis will be done.

In order to register for the course, the student will need to have worked out a topic (or at least a domain of study) which the supervisor has agreed to. This means specifically (and minimally) that the professor has a sense that the topic is suitable and will be fruitful as a research topic, that the student will be able to complete it in the time required, and that the professor has enough time to serve as supervisor.

Because it is common for students to go through a few potential topics before coming to one that both they and the supervisor agree to, students are strongly encouraged to begin discussing possible topics with potential supervisors as early as possible. (It is good to discuss a potential topic, for instance, at the start or during the course of the semester *before* the one in which the Thesis will actually be done.)

Completing a Thesis is an intensive and rigorous process that is pushed forward not by the guidance of the supervisor, but primarily by the student. Thus, it should only be undertaken by students who wish to, and are academically prepared to, take on an academic research project requiring this level of self-directedness. For the project to begin, the Thesis supervisor and CL advising faculty must also agree that the student's overall performance in the program has been sufficiently strong to enable them to carry out Thesis work successfully. Where this is not the case, faculty may require the student to instead satisfy their Exit Requirement via an Internship or Capstone Project, given that the latter two would better serve the student as they prepare to finish the program and work out a good placement for after graduating.

The Thesis process typically involves regular (usually weekly or bi-weekly) meetings with the Thesis supervisor, and numerous drafts of the Thesis before the final version is ready to submit. As a rough

guideline, CL MS theses are roughly 40-60 pages, including the bibliography and any appendices. The content should be worked out in close collaboration with the Thesis supervisor, but typically includes:

- An introduction that defines the problem, laying out why it is interesting and hard, reviewing prior related literature, outlining possible strategies for solving the problem, and describing the approach proposed
- A chapter detailing the author's approach, including an introduction of the proposed analysis' components and the experimental/corpus design
- A chapter specifically on the corpus design and experiments
- A chapter discussing the results and consequences
- A bibliography, and, if appropriate, one or more appendices.

The Thesis presentation

When the Thesis is ultimately in a finished state that the supervisor deems to be of passing quality, the supervisor will hand in a grade for the Thesis, and sign the Thesis Certification form—which, along with the student uploading the Thesis to the University repository, constitute the official completion of the Exit Requirement via a Thesis.

However, it is expected that all Thesis writers will give a presentation afterwards, typically held along with other Thesis presentations in a session during Finals Week. These are structured like typical Master's Thesis defenses at other American universities. There is generally a period of at least one week between the day on which the student sends the Thesis to committee members and the date of the presentation itself, which allows committee members the time to read the Thesis before the presentation.

A Thesis defense is essentially an oral examination, and so the presentations for our Theses take this format. The student first gives a presentation of the Thesis content, and then responds to questions on this content posed by a committee—where the committee consists of the Thesis supervisor plus one or more other faculty members (typically 1-2) with knowledge on the Thesis topic.

▶ **Very Important note:** the Registrar's Office and GSAS set deadlines for each degree date by which the FINAL version of a Thesis must be approved and uploaded into the university's computer system. This deadline has begun in the last few years to occur much earlier than is ideal—namely, within last few weeks of the term in which the student plans to graduate, and well before the last day of classes that term. For instance, MS theses for students wishing to graduate in Spring 2019 must be completed by April 12. However, classes do not end until May 2, and final exams run through May 14.

Therefore:

- Students and their supervisors should plan Thesis progress carefully, planning backwards from the university's date for the Thesis to be accepted and uploaded, to ensure that the Thesis can be finished in time for the appropriate graduation dates. When this is not achieved, the student's graduation date will need to be delayed. (For instance, if the May graduation deadlines are not reached, then the student would not be able to officially graduate until August—though all degree requirements could be finished before that, and we would be able to produce a letter certifying this, if needed for an employer or additional graduate program.)

It is in fact common for Thesis students to graduate in the Summer rather than Spring term, and this can be another consideration for students who choose to undertake a Thesis. When this happens, it is important to note that summer fees once 4 full-time semesters have been completed are very significantly lower (totaling a few thousand dollars or so) than a tuition for a full-time semester. It has often been possible as well to avoid paying summer fees, if the Thesis is completed by an interim date soon after classes end that we have been able to negotiate in prior years. Thesis writers should keep in close contact with CL advising faculty about their estimated completion date, as the end of the term approaches, so that the advising faculty can assist with the process as needed.

- Despite the fact that e.g. Internships for the Exit Requirement are generally completed straightforwardly in the one semester minimum required, students interested in completing a Thesis for their Exit Requirement are advised to seriously consider completing it in two semesters, to allow enough time for process to take place by the graduation deadlines. Students who opt for one- semester Theses will still benefit from beginning discussions with a potential supervisor about the Thesis topic and content, and beginning background reading and thinking, during the term prior to the one in which the Thesis is officially undertaken.

Another helpful option if completing a one-semester Thesis can be to take the Fundamentals of Linguistic Research option during the Fall semester, which helps students develop a topic and establish research skills needed to complete the Thesis.

Completing a Capstone Project

The Capstone Project is a new, third option for satisfying the Exit Requirement that is being added beginning in the 2018-19 school year. It will be satisfied via a full 4-credit course that will soon be added to the Bulletin and Schedule of Classes. At that time, students will be given full information on what it encompasses.

Roughly, the Project will involve the student developing a significantly sized CL project of an applied nature, and of the student's own design. It will have a substantial scale and workload, equivalent to that of the Exit Requirement Internship or Thesis. The Project would be something that the student could add to their portfolio, and that would be helpful to them particularly in applying for CL positions in industry after graduating.

While the details for the requirements and evaluation of the Project will soon be finalized, it is likely that enrolling in the course will involve the student attending throughout the semester the lab meetings of the Professor who has agreed to supervise the Project. This will provide an environment in which the student can share ideas, and receive feedback as they progress. Upon completion, it is likely that the student would be required to give a public demonstration of the Project, and hand in thorough documentation and related materials for evaluation.