LING/SLAT 503
Jackson
Summer 2026

Foundations of Syntactic Theory[1]

Course Information

This course is an introduction to syntactic theory with an emphasis on data analysis, critical thinking, and developing a model of grammar to characterize real language data. The type of grammar that we will build takes the generative Chomskian approach to the syntax of natural languages. We will use theoretical frameworks that originated from Chomsky's *Syntactic Structures* in 1957, through the approaches of *Government and Binding*, *Principles and Parameters*, and the *Minimalist Program* extending nearly to the present day, and will cover the concepts of constituency, phrase structure rules, X'-theory (pronounced "X-bar"), binding theory, head movement, DP movement, *wh*-movement, argument structure & ditransitive verbs, and control & raising. This run of the course is tailored for students in the *MS in Human Language Technology* program, and highlights the importance of these concepts for language technology applications.

Course objectives

We will examine the syntactic structure of language within the *generative* framework of syntax. In this approach, the linguistic knowledge of a human language speaker is modeled by a formal, symbolic (ie, not probabilistic) system of rules and constraints which can generate all and only the sentences that are part of the speaker's language.

Although we label this approach *generative*, it is generative in one formal sense of that word: we create a finite set of rules, constraints, and lexical items, and by applying these rules and constraints to produce all possible options and orders of combining lexical items, we will *generate* an unbounded set or *enumeration* of the possible sentences in a language. This generative model should not be confused with the actual time-based process of the production of a sentence by human speakers of a language, which we'll leave as a problem of psycholinguistics and language processing.

To put it another way, if we consider all possible combinations of all the words of a language, we can note that some, but not all, of those combinations are actually produced and understood by speakers of the language, which we say are the *grammatical* sequences of words. The goal of our model is to represent the knowledge that speakers of this language have which allows them to determine whether a sequence of words is grammatical or not; we do this by creating a formal mechanism which will be able to produce all and only the word combinations that are grammatical. To take a concrete example, for sentences that are built using the words "the", "dog", and "barked", the model of grammar that we'll build will provide a

[1]The original development of this course was done by Andrew Carnie and later adapted by Jianrong Yu.

way to assemble these words into the grammatical sentence "The dog barked"—which is the **only** way to arrange these words into a sentence acceptable for most speakers of English—but will provide no way to assemble these three words into the sequences "Barked dog the", "Dog barked the", and all other sequences. Our model *should* produce every sentence that speakers of the language would consider grammatical, and should *not* produce any sentences that speakers of the language would consider ungrammatical.

As we go through the process of developing this model, we will see how various modules of human language systems—primarily the semantic and morphological modules—interact with syntax to affect whether a sentence is grammatical or not, and how universal constraints control or limit a sentence's grammaticality. Since summer sessions of this course are primarily taken by students in the *MS in Human Language Technology* program, our approach to building a formal grammar will emphasize the coverage of empirical data that would be required in order to appropriately model the full range of human linguistic competence. **For HLT students, consider this course an exploration of the range of natural language data and an application of formal tools for modeling grammar.**

We will...

- progressively build and iteratively improve a formal system (ie, a model or a grammar) to characterize grammatical and ungrammatical sentences in human language.
- apply principles that have guided the historical development of syntactic theory.
- apply the scientific method to generalize data, form hypotheses about a model, and test them against more data.
- compare syntactic models by evaluating their conceptual and empirical strengths.
- develop hypotheses based on language data and evaluate arguments to support those hypotheses.
- practice structuring arguments in a coherent and convincing way.
- develop skills of analyzing data across a wide variety of distinct languages, to create a model whose possible alternative structures explain not just the behavior within a single language, but also variations between languages.
- compare and contrast hypotheses about models of possible and impossible human languages.

Learning outcomes

By the end of this course, successful students will...

1. be able to describe the complexity of sentence structure in human language.
2. be able to compare models of syntax conceptually and empirically.
3. be able to identify the data needed to confirm or refute a hypothesis regarding a model of language.

4. develop skills to analyze data across a wide variety of human languages.†
5. be able to give structural analyses of natural language sentences, which form the basis of practical applications in natural language processing, parsing, and information extraction.†
6. be able to use tools for representing the constituent structure of sentences in natural language.‡

† relates to Linguistics HLT program outcome #2.

‡ relates to Linguistics HLT program outcome #3.

HLT program learning outcomes

By completion of the HLT program, students will be able to:

1. **Write, debug, and document readable and efficient code** in programming languages commonly used to develop, implement, and evaluate HLT models, as demonstrated through course projects and a professional internship.
2. **Select and apply appropriate algorithms and core concepts** in HLT to perform common tasks and solve realistic problems, as demonstrated through course projects and a professional internship.
3. **Apply common tools and libraries** used in HLT by integrating them into course projects and real-world applications or workflows, as demonstrated through course projects and a professional internship.
4. **Demonstrate professional skills** in the field of HLT, including effective teamwork, clear and concise communication, professional networking, understanding of business procedures and team-based code development, leadership, and critical thinking, as demonstrated through course presentations, projects, and a professional internship.

Locations and Times

This is an asynchronous online course. According to University of Arizona policy, class attendance is demonstrated by active participation in course-related online activities, such as interacting with D2L pages, the course forum, online practice exercises, and so on. Course sessions will not be held in-person. Please see the course D2L page for important dates and further information.

Prerequisites

No courses are required beforfe enrolling. Graduate-level skills in reading and writing are assumed.

Instructor

name	Eric Jackson
email	ejackson1@arizona.edu
hours	Mondays 2:00pm–4:00pm (Arizona time, UTC-7) in person (COMM 114A) and online via Zoom at `https://arizona.zoom.us/j/85678652639` (passcode 816071), and by appointment.

My working hours are normal business hours in Arizona (M-F 9am-5pm), and I generally do my preparation and grading for the course at that time.

The best way to contact me is to send me an email or a forum message. I try to respond within 24 hours, but *during* working hours, I may be grading coursework, meeting with someone, or recording lectures, so my response may not come immediately. If there's a chance you may need my response, don't wait to discover that when a deadline is upon you.

I know that normal business hours in Arizona are not convenient for everyone, especially those in online asynchronous courses. If this describes you and you need to meet outside of Arizona business hours, I'm holding Thursday evenings open. Contact me in advance to set up a time and a link; I won't otherwise be online then.

Course forum (Zulip)

For this course, we'll use a forum that is outside the course website, though still provided by the university. Some participation-graded activities will take place on this forum, so make sure you sign up in the first week.

In addition to the assigned forum activities, you're free to start discussions there with the class, or post questions about the course. Bear in mind that responses from the forum (from me or from other students) may be quick, but this is not guaranteed. You should plan as if forum responses may take twelve or more hours.

Textbook and readings

The textbook we'll use in this course is available for free (digitally) through the library. You'll need to log in to UA Libraries with your NetID and password to access the book in this way. You are also free to obtain a paper or digital copy of this textbook on your own.

Carnie, Andrew. 2012. *Syntax: A generative introduction*, 3rd edn. John Wiley & Sons.

ISBN-13: 978-0470655313

`https://arizona-primo.hosted.exlibrisgroup.com/permalink/f/evot53/01UA_ALMA51636404370003843`

There is a 4th edition of this textbook, but it is not yet available digitally through the library. Until it's available digitally, we'll stick with the 3rd edition.

Supplemental readings, if any, will be provided digitally through the course website.

Requirements and grading

Students are expected to actively participate in the course by watching the recorded lecture videos, reading and digesting the assigned readings, completing any assigned homework or activities, and engaging with the instrucror and other students in the course forum. You are all adults, and I expect you to take responsibility for your own learning.

Readings

Readings from the textbook will be assigned for each unit of the course. You may read the assigned sections before you watch the lectures, **but you must read the assigned sections and complete any reading-based activities before the end of that week.** Watching the lecture videos is not a substitute for understanding the readings. (See *Participation-graded activities* below.)

Lectures

Lecture videos will be available through the course D2L page. You are expected to watch all lectures and understand the content.

If the content of a unit is not clear to you on the first viewing, don't panic. Make sure you've done the readings from the textbook, and try watching the lectures a second time. You're free to search for other presentations of the same topic online, but note that other explanations online may use different assumptions from those that we'll use in this course. If a concept is still unclear, you should send a question to the instructor by email, meet with the instructor in regular office hours or arrange another time to meet, or post a question for clarification on the course forum.

Homework

There will be seven graded homework assignments, one each week. Note that the last week is shorter than others. Graded homework assignments will be given via D2L. Student homework submissions will also be collected through the assignment item in D2L and must be in PDF format; files submitted in any other format (.doc, .docx, .rtf, .odt, .txt, or any other) will not be accepted. Freely available options to convert files to PDF include Google Docs and LibreOffice. Handwritten assignments are acceptable, so long as they are in PDF format and are reasonably legible.

Participation-graded activities

In addition to graded homeworks, there will be three types of ungraded assignments. Completing these assignments before the due date and time is all that is required for full credit. Although your performance on these assignments is not evaluated for a grade, engaging your thinking to complete these assignments to the best of your ability will ensure the greatest learning benefit for you! The more effort you put in, the more learning benefit you will receive.

One type of participation-graded activity is a weekly response to the assigned reading. You will post these on the course forum in response to prompts that will be provided on the course website, under the each week's **Reading** item. Although you are minimally required to post your own response to the reading, you are encouraged to read and respond to other students' posts, as well.

The second type of participation-graded activity is a question set that is embedded in some of the videos. Some questions are open-ended, while others have specific answers. Questions with specific answers can be attempted *multiple times* until you arrive at the correct answer. They are not intended to add stress, but to break up long videos and to give you opportunity to actively apply the content of that video. Although your answers are not graded for content, doing your best to answer them by applying the content from the video *will* affect how much of the course content you understand and retain. Please note that you must complete watching all of a video lecture before your grade on that video's questions are recorded in D2L's gradebook.

The third type of participation-graded activity will be a weekly TopHat Review & Mastery activity. These activities give you another opportunity to practice applying the concepts from the week in a setting where it's perfectly fine to get an answer wrong. After you complete your own answer, you'll be shown a model answer to the same question. I encourage you to compare your answer to the model, to see if there were elements you could have added to make your own answer stronger or more complete. **The tree-building exercises in TopHat are also a great opportunity to see "model" trees that may help you as you apply the week's model to build trees on the graded homework assignments.**

Grading

Participation-graded assignments are graded as one point for completion or zero for non-completion. All your graded assignments are given numerical scores, with the number of points available specified for each assignment. A final course grade of A, B, C, D, or E will be given. The following minimum percentages will guarantee the corresponding letter grades, in accordance with university policy:

A: 90–100%
B: 80–89.9%
C: 70–79.9%
D: 60–69.9%
E: 0–59.9%

The assignments and activities will contribute to your final grade as follows:

type	number	total
homework assignments	7	60%
video questions	55	10%
reading responses (forum posts)	7	15%
Review & Mastery activities	7	15%
total		100%

The due date for each assignment will be posted with the assignment in D2L. All times will be given in Arizona time (Mountain Standard, GMT-7). If you have an unexpected life event that will keep you from completing an assignment on time, talk to me about accomodation as soon as you can. **Late work, except as allowed by university policy, will not be accepted.**

Course schedule

The course is divided into seven topical modules, one each week, with readings, lectures, activities, and assignments for each module. All course material are available on D2L. Specific pages for each

official reading assignment will also be found in D2L. All dates and times for the course are in Arizona Mountain Standard Time (MST-7).

Start date	Unit topic	Reading
5/18/26	Unit 1: Preliminaries	Ch 1, 2, end of 3
5/25/26	Unit 2: PSRs and Binding	Ch 3, 4, 5
6/1/26	Unit 3: X'-theory	Ch 6, 7, 8
6/8/26	Unit 4: Head and DP movement	Ch 10, 11
6/15/26	Unit 5: *Wh*-movement	Ch 12, 13
6/22/26	Unit 6: Ditransitive verbs, control and raising	Ch 14, 15
6/29/26	Unit 7: Advanced binding theory, wrap up	Ch 17

Technology

This course won't involve programming in the same way that other HLT courses do. However, I may point you to some tools that will help you work with the concepts we're learning in this course. If I point you to it, it means I've at least gotten it to work for me—and I can provide limited support in getting things running for you, too. I have a preference for web-based or cross-platform solutions, but since I'm running Linux, I may not be able to help with the specifics of getting things running in Windows or MacOS.

Student collaboration, novel work, & appropriate AI use

TL;DR: Your use of generative AI tools in this course is governed by the same rules that apply to how you use resources you find online and the way you might discuss this assignment with other students. You're permitted to read about the topics in this course online, you're permitted to talk to other people about the topics in this course, and you're permitted to use generative AI tools as part of the learning process, if you choose. Regardless of the resources you use, you must critically evaluate the trustworthiness of those resources, **and for all assignments, the work you submit must be new and must represent the product of your own intellectual effort.** You must include written citation of any outside resource you use for any assignment you submit.

Why is this the appropriate position on collaboration and AI use for this course?

The goal of this course is not simply for you to produce a program, a document, or a thing of any type. The goal of this course is for you to *develop your own cognitive skills*, so that you become able to apply an idea or produce something new. Knowing how to find the answer or apply a model by asking a person, performing an internet search, or consulting a chatbot is not the same as developing that knowledge or skill in your own mind. To develop your own mind, you need to **use** your own mind. You will gain the most benefit from the learning tasks in this course if **you** are the one who has come up with all the code, analysis, or examples, even if this requires a bit of mental struggle on your part to get it right. **Don't be afraid to struggle for a bit, and don't be afraid to submit work that may not be perfect as long as it represents your own thinking, because the mental effort that you put into your own work is helping you learn.** Beyond a moderate amount of struggle, please seek outside help from the instructor.

What do I mean that student submissions must be new and must represent the product

of your own intellectual effort?

Students are encouraged to discuss problems and general approaches for solutions with the instructor and with others in the course, but because of the course goal stated above, everyone must turn in **work that is the product of their own mind**. You may not submit assignments that are substantially the same as any other source (your classmates, someone online, or an AI tool).

What do I mean that outside resources (people, websites, generative AI tools, or anything else) must be cited in writing?

When you want to refer to an idea that you learned about from someone else, academic integrity requires that you state that fact: whose idea it was, and where they said it. When this is used in academic writing, it can look like a quotation or a citation. Any time that you refer to an outside resource, you must also **critically evaluate the trustwortiness of that resource**. It is possible for ideas in a book or on a website, your classmates' ideas, and the output of a chatbot to be incorrect, sometimes in ways that require careful thought in order to detect.

Any outside collaboration (with humans, websites, or other sources) must also be **documented on your assignment** in order to be acceptable. If you discuss an assignment with a peer, if you find inspiration from a web resource, or if you use generative AI for help (all of which must still be within the limits described here in order to be acceptable), you must cite that fact on your assignment. When the resource contributed in a general way to your work, this can take the form of a statement at the top of your submission:

- "I discussed this assignment with Jane Studentname and Joe Wildcat."
- "I wrote this code following a suggestion from StackOverflow at <URL>. The code from that page constitutes roughly 10% of my submitted code."
- "I used ChatGPT for brainstorming of approaches to this problem, but wrote all of the text of my answer myself."

It is also appropriate to give citations at a relevant point in a written document. This is conventional in academic writing, and can be applied to citations from generative AI tools, as well:

> *Citation within text:*
> "As noted by earlier work (Chomsky and Halle 1968), the usefulness of this feature is..."
> *Corresponding entry in a list of references:*
> Chomsky, Noam, & Morris Halle. 1968. *The Sound Pattern of English*. New York: Harper & Row.

> *Citation within text:*
> "As suggested by one AI tool (OpenAI 2025), the topics to be included are..."
> *Corresponding entry in a list of references:*
> OpenAI. 2025, August 21. High school grammar concepts [Generative AI chat]. ChatGPT. `https://chatgpt.com/share/68a77b60-0ee4-800c-9acc-cd3fd573c311`.

See the APA Style Blog (see https://apastyle.apa.org/blog/cite-generative-ai-references) for a general format for such citations.

How much of a submission needs to be mine in order to be acceptable?

The general principle in all assignments is that a supermajority (at least 75%) of the work you turn in must be new and must be your own. This has often caught international students by surprise; please pay special attention if this is different from the academic practices at your past institution. Do your own work, and please ask me in advance if you are unsure whether something will be acceptable or not.

Special considerations for programming assignments: Using portions of code you found online or created with generative AI is acceptable, but it must constitute no more than 25% of your total code. If you obtain *any* code other than writing it yourself, you must also evaluate it critically **and clearly state on your assignment how much code is from other sources, also citing where it came from** (Stack Overflow, ChatGPT, CoPilot, etc). Using code from another source but simply changing the variable or object names is not a sufficient contribution on your part to make it "your code".

When the work you submit consists largely or entirely of quotations or references from other sources, it may no longer represent sufficient contribution from the student(ie, it may no longer be "your own work") **and may not be acceptable for credit.**

Submissions that do not cite others' contributions but that seem to contain or refer to the ideas of others—suspiciously similar to another student's submission, to a source online, or to outputs of generative AI—will be considered plagiarism, will constitute violations of the university's Academic Integrity policy, and will be forwarded to the Dean of Students office in accordance with standard procedures for the Code of Academic Integrity (linked below). Please be a responsible adult and don't run the risk of losing credit for an assignment or for the course (1) by failing to cite sources you use, or (2) by copying, by allowing others to copy from you, or by having ChatGPT do your assignment for you.

I want to make certain that students understand the reasoning behind this policy:

Generative AI is a useful tool, like a calculator is a useful tool for doing math. However, in order to train elementary school students' cognitive skills, we ask them first to learn to carry out some math operations in their head or on paper before they default to using a calculator. The point of having students work through those problems without a calculator is not simply to get the right answer, but ***to develop their ability to think in certain ways****. The same is absolutely true about the use of generative AI.*

Learning to use a tool is sometimes important, but developing your own thinking is **why you are at a university**. In some contexts, being able to use a calculator is an important skill, while in other contexts, like when you're taking a math test to see whether you know basic math facts, solely using a calculator harms your own learning. If you need to get from one place to another faster and more efficiently than running, a bicycle might be a reasonable tool, but if you're preparing to compete in a 5k run, it won't help you to train for running solely by riding a bicycle. You may need to know how to use generative language models as a tool for tasks at some point, but having one write your homework or forum posts for this class not only means your mind won't understand these concepts as well as it could, it also constitutes an academic integrity violation. Put in the thinking yourself, so that you can reap the mental benefit for yourself.

Moreover, the metaphor of generative AI as a calculator is not a perfect one. Generative AI is like a calculator whose output is wrong in ways that are hard to predict. You need to know how to

apply ideas and tools from this class on your own well enough that you can see where AI output is partially or completely off the mark, or introduces subtle logical errors.

The UA Library has a guide for students as to what is and is not appropriate use of AI and similar resources:

`https://libguides.library.arizona.edu/students-chatgpt/`

University boilerplate

All of the following items are required by the university to be included on syllabi. If you find something here that is surprising or unexpected, please bring it up with me as soon as possible.

By way of a brief summary:

Disabilities If you have a disability that affects how you will need to do the work in this class, please let me know *within the first week of class.*

Academic Code of Conduct Cheating and plagiarism are not remotely acceptable in any way. You are responsible for knowing whether your own behavior qualifies as plagiarism, and whether your use of AI is inappropriate. Disruptive behavior in class—which here includes audio, video, or text on any of our course websites or by email—is not acceptable. Please be respectful of others.

Sensitive Material This is a university and you are adults. It is possible that we may touch on topics that some students could find sensitive during the semester. Given the focus of this course, this seems unlikely, but I alert you nonetheless.

Health & Wellbeing

The university has a specific site for health-related information: `https://health.arizona.edu/`. If you are experiencing personal or financial challenges from any health-related issue, let me know as soon as you can if we need to make accommodations, and please stay safe.

The semester ahead may come with ups and downs in both physical and mental health, but there are lots of ways to support yourself. Eat well, get regular exercise, and don't neglect things like self-care, talking with friends and family, or getting a fresh perspective from a supportive group. Stress is a normal part of life and may even motivate you sometimes, but chronic or overwhelming stress can affect your physical and mental health and wellbeing. Pay attention to your personal signs that you're overly stressed, like changes in your mood, appetite, sleep, behavior, or new physical symptoms (aches, pains, etc.) that interfere with school and daily life. If you notice these signs or have questions about helpful resources, I welcome you to talk with me. You can also visit `caps.arizona.edu/mental-health` for mental health tools and resources.

Mental Health & Wellness Resources

- **Health & Wellness:** Campus Health provides quality medical, mental health, and wellness services for students. Visit `health.arizona.edu` or call 520-621-9202 (520-570-7898 for help after hours)

- **Mental Health:** Campus Health's Counseling & Psych Services offers a range of mental health support tools and services like self-care strategies, peer support, groups and workshops, and professional mental health services. Visit `caps.arizona.edu/mental-health` or call CAPS 24/7 at 520-621-3334 to learn more.
- **Crisis Support:**

  Suicide & Crisis Lifeline: call 988 Crisis Text Line: text TALK to 741-741 Visit `preventsuicide.arizona.edu` for more suicide prevention tips and resources

Absence and Class Participation Policy

Attendance in an all-online course is not evaluated like attendance in an in-person course. For this course, attendance will be represented by active reading, completion, and participation in online course activities, including loading/viewing materials and completing activities posted on D2L, OpenClass, our course forum, and any other related websites.

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: `http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop`

The UA policy regarding absences is that any sincerely held religious belief, observance or practice will be accommodated where reasonable, `http://policy.arizona.edu/human-resources/religious-accommodation-policy`.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: `https://deanofstudents.arizona.edu/absences`

Classroom Behavior Policy

To foster a positive learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel comfortable with each other and where we can challenge ourselves to succeed. To that end, our focus is on the tasks at hand and not on extraneous activities.

Students are asked to refrain from disruptive conversations with others in the course, including on asynchronous course platforms. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue inappropriate behavior will be removed from that venue and may be reported to the Dean of Students.

Threatening Behavior Policy

The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See `http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students`.

Accessibility and Accommodations

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability

Resource Center (520-621-3268, https://drc.arizona.edu/) to establish reasonable accommodations.

Code of Academic Integrity

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. **If you use an idea, passage of text, or code snippet that is based on discussions with a classmate, that you found online, or even that you got from a large language model, it's important to cite where it came from, whether that source was Sally Classmate, a book by Noam Chomsky, stackexchange.com, or ChatGPT.**

Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity.

The UA Library provides a helpful learning module for students to understand and avoid plagiarism: https://libguides.library.arizona.edu/info-strategies/plagiarism

The UA Library also has resources to guide you to appropriate and safe use of AI and large language models: https://libguides.library.arizona.edu/students-chatgpt/integrity

UA Nondiscrimination and Anti-harassment Policy

The University is committed to creating and maintaining an environment free of discrimination; see

http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy

Subject to Change Statement

Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.