

IDS 2935: Language and Computers

Quest 2

I. General Information

Class Information

- Spring 2024
- **Lecture Time:** MW 9:35am
- **Lecture Classroom:** TUR L005
- **Discussions:** Fridays (check One.UF)

Instructor

- Sarah Moeller
- smoeller@ufl.edu
- **Office:** Turlington 4017
- **Office Hours:** Wednesdays
10:30-11:30am & 3-4pm

Teaching Assistants

- Catrin Seepo
- cseepo@ufl.edu
- **Office:**
- **Office Hours:**
- Shengyu Liao
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- **Office:** Dauer Hall 36
- **Office Hours:** T 3:00-4:55 p.m.

Course Description

Language technology has a profound influence on the way ordinary people use language. This morning, because you speak English, you may have already used voice recognition or predictive text. This course explains what language technology is and why it is available for about 1% of the world's languages. Along the way, we will attempt to answer a big pressing question for our society: Can artificial intelligence be inclusive of all ways of speaking all languages?

We will identify, describe, and explain the cross-disciplinary dimensions of this question which lie partly in social science principles of human communication (e.g. conversational turn-taking), partly in linguistics theory (e.g. how to build sentences), and partly in computer science (e.g. ASCII vs. Unicode). Topics include spellcheckers, translation, chatbots, and language learning. These topics are examined in the context of globalization, language endangerment, and the recent rapid rise of AI.

This course assumes no background in linguistics or computer science and only an introductory grasp of statistics. It introduces the fundamentals so that students can peek under the hood of AI. Students will analyze digital systems that "understand" human language. They will explore how societies around the world experience language technology and reflect on their own use. Assignments require students to connect analytical, linguistic, and technological skills to human and AI behavior that they are encountering in their personal and professional life. They will be asked to discover and communicate a reasoned critique or recommendation to challenges that arise when we "teach" computers to process human language.

Quest and General Education Credit

- Quest 2
- Social & Behavioral Sciences
- Writing Requirement (WR) 2000 words

This course accomplishes the [Quest](#) and [General Education](#) objectives of the subject areas listed above. A minimum grade of C is required for Quest and General Education credit. Courses intended to satisfy Quest and General Education requirements cannot be taken S-U.

Required Readings and Works

- Dickinson, Markus, Chris Brew, and Detmar Meurers. 2013. *Language and Computers*. Wiley-Blackwell. (abbreviated as **LaC** on schedule). *An e-version is available through the UF library but access is limited.*
- Writing guide: “The Only Guide to Essay Writing You’ll Ever Need”. Grammarly Blog: <https://www.grammarly.com/blog/essay-writing/>
- The **writing studio** is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio at <http://writing.ufl.edu/writing-studio/> or in 302 Tigert Hall for one-on-one consultations.
- Required citation guidelines: https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/index.html
- Any additional readings will be available on Canvas.
- Materials and Supplies Fees: n/a

II. Graded Work

Description of Graded Work

The grade for this course is based on in-class exercises and quizzes, 6 homeworks, 1 essay (fulfilling the E2 writing requirement), and 1 exam.

Participation	5%
Quizzes	10%
Homeworks	50%
Writing Requirement (final essay)	15%
Final exam	20%

Participation: Group and individual exercises are assigned from time to time in class and these exercises count for a sizable portion of the participation grade. The grade for an in-class exercise may be excused only if attendance has been excused by the instructor.

Homework Assignments: Homeworks are due about every two weeks. Students are encouraged to discuss assignments, but all submitted work must be their own. Most homeworks relate to the writing

assignment. Late assignments will NOT be accepted without a medical or official accommodation letter, no exceptions!

Final Exam: The final exam (4/30/2024 @ 10:00 AM - 12:00 PM in Tur L005) covers terminology, concepts, and mathematical algorithms that students will encounter in lectures and readings.

Writing Requirement (WR): The writing requirement is a four-part essay that is evaluated for the E2 writing requirement (formerly known as the Gordon Rule). The writing assignment ensures students maintain their writing fluency, use writing as a tool to facilitate learning, and can perform independent research to support and clarify their writing. The essays will be graded based on the requirements and the rubric provided in this syllabus, plus additional written guidelines that students will receive. The grade may depend in part on students' response to feedback received in homeworks. Feedback on writing skills will be provided no later than the end of the semester.

Students will submit a final essay of 2000-2225 words that critically analyzes an issue related to language technology and its impact on human society. Every paragraph must have a clear thesis statement. Every thesis statement must be supported by specific examples and/or illustrations. Claims must be supported by appropriate citations. Students are encouraged to employ charts and figures with descriptive captions. The essays must make educated use of quotes and citations. Students must include a bibliography using the required citation style (see above).

The essay must respond to each of the prompts below, with a minimum of one paragraph per prompt. The final essay must include a descriptive title and introductory and conclusion paragraphs.

1. What is one current issue that is related to how or whether computers can store, represent, generate, or process (“understand”) human language?
2. In what concrete ways has this issue been enhanced, addressed, or solved or what specific ideas have been proposed to address this issue?
3. How might this issue or its (proposed) solutions/enhancements impact human society, now or in the future? What specific emotional, political, or social responses have emerged because of this issue or its (proposed) solutions/enhancements?
4. How has this issue or challenge impacted yourself or someone who you know? How has your understanding of this issue changed since learning more about it? How might this change your actions or responses to this or similar issues in the future?

Partial or full plagiarism will result in a 0 score for the assignment and may result in F for the whole class. Never copy writing from another source and submit it as your own intellectual property, even from a computer! You may make use of AI tools to spur the creative process, develop the logical organization, or improve your final edit. If you have *any doubts* whether you are crossing the line into plagiarism, consult with the instructors!

Grading Scale

For more information: <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

A	94 – 100%	B	84 – 86%	C	74 – 76%	D	64 – 66%
A-	90 – 93%	B-	80 – 83%	C-	70 – 73%	D-	60 – 63%
B+	87 – 89%	C+	77 – 79%	D+	67 – 69%	E	<60

Rubrics

Writing Assessment Rubric (HW 3, 4, 5 drafts & WR)

	SATISFACTORY (Y)	UNSATISFACTORY (N)
CONTENT	Exhibits evidence of complex ideas that respond to all four prompts. Critically synthesizes at least 3 appropriate cited sources and provides adequate discussion with basic understanding of topic and sources.	Either includes a central idea that is unclear or unfocused or themes that are off-topic, or provides minimal or inadequate discussion of ideas. Lacks sufficient or appropriate cited sources.
ORGANIZATION AND COHERENCE	Exhibits clearly identifiable structure, including a clear central idea, clear statement of the main topic and clear thesis statements that are related to each prompt and thesis sentences for every paragraph. At the weak end of Satisfactory, it may require readers to work to follow progression of ideas.	Either the whole essay or some of the paragraphs lack clearly identifiable organization. May lack coherent sense of logic for association of ideas and their organization. May lack transitions to guide reader.
ARGUMENT AND SUPPORT	Uses persuasive and confident presentation of ideas, strongly supported with evidence/examples and citations that support the ideas. At the weak end, may provide only generalized discussion of ideas, or provides adequate discussion but relies on weak support or poorly chosen examples.	Makes only weak generalizations, providing little or no support. For example, paragraphs are summaries or illustrations without a critical analysis or clear connection to central idea, or contain no evidence or examples.
STYLE*	Uses a writing style and word choice appropriate to the context, genre, and chosen style. Sentences display complexity and logical structure. On the weak end, displays a less precise use of vocabulary and an uneven use of sentence structure or uses a writing style that occasionally veers in word choice or tone	Relies on writing style and word choice that is inappropriate for the context, genre, or discipline. Sentences may be overly long or short or have awkward construction. Author may use words incorrectly
MECHANICS*	Features correct and error-free presentation of ideas. At the weak end of the Satisfactory, may contain word choice, punctuation, or grammatical errors that do not muddy the paper's argument or points but show evidence of over-dependence on language technology	Contains so many mechanical or grammatical errors that they impede the reader's understanding or severely undermine the writer's credibility

- *The instructors will evaluate the writing requirement (WR) by this rubric and provide feedback.*
- **WR grades have two components.** *To receive writing requirement credit, a student must receive a grade of C or higher on the course and a satisfactory completion of the writing component of the course.*

Rubric for HW 1, 2, & Self-Reflections

	High Quality	Average	Needs Improvement
Informed	Shows evidence of having done the assigned work		Does not show sufficient evidence of having done the whole assigned work
Thoughtful	Shows evidence of having understood and considered issues raised		Does not show unambiguous evidence of having engaged with or considered issues raised
Style & Mechanics	Satisfies the writing rubric in these two areas		Does not completely fulfill the writing rubric in these areas

III. Annotated Weekly Schedule

Week	Topics, Homework, and Assignments	Required Readings	Assignments (Deadlines on Canvas)
Week 1 1/8	Topic: What is a Computer’s Native Language? Summary: Why do computers “speak” binary? What are bits and bytes?	Syllabus & “Writing Requirement”& LaC pp. 1-5	
Week 2 1/15	Topic: Can Computers “Read” Any Language? Summary: How many ways do humans write? Why did computers abandon the ASCII system for Unicode?	LaC pp. 5-17	
Week 3 1/22	Topic: Can Computers “Hear” Any Languages? Summary: Why does(n’t) your phone understand you? How do computers connect language with speech and speech with text?	LaC pp. 17-25	Homework 1
Week 4 1/29	Topic: How do Computers Learn to Spell? Summary: How many kinds of spelling errors do humans make? How are spellcheckers built?	LaC pp. 33-44	
Week 5 2/5	Topic: How can Language Become Numbers? Summary: How do probability and statistics help computers “understand” language?	LaC pp. 26-29 & “Under the Hood 2” (pp.)	Homework 2
Week 6 2/12	Topic: Can Computers Help Anyone Write? Summary: What unique language structures do computers need to know? How do grammar checkers work? How is the history of computer science tied to language theory?	LaC pp. 49-65 & “ Guide to Essay Writing ”	
Week 7 2/19	Topic: How do Computers Learn? Summary: What is the main engine of AI? How does machine learning work?	LaC pp. 127-133	Homework 3
Week 8 2/26	Topic: Can Language Technology Solve Crimes? Summary: How do computers recognize the author of a document or the author’s attitude (sentiment) or emotion? How does this help fill your spam folder?	LaC pp. 133-151	
Week 9 3/4	Topic: How Well Do Computers Talk? Summary: How do human conversations happen? How do computers “converse”? What is the difference between chatbots and voice assistants?	LaC pp. 153-177	Homework 4

Week	Topics, Homework, and Assignments	Required Readings	Assignments (Deadlines on Canvas)
BREAK			
Week 10 3/18	Topic: How do Computers Teach Languages? Summary: Do computer-aided language learning systems give a more effective learning experience? How do they change the nature of language learning and teaching?	LaC pp. 69-87	
Week 11 3/25	Topic: What Languages Use the Internet? Summary: What are the tools and techniques of search engines? How do computers deal with structured or unstructured data?	LaC 91-108 & 115-118	Homework 5
Week 12 4/1	Topic: How Many Languages Do We Speak? Summary: In what ways do languages differ in meaning and structure? Why is machine translation important but not always possible? What makes translation hard?	LaC pp. 181-194	
Week 13 4/8	Topic: Are Computers Multilingual? Summary: How is machine translation tied to the historical development of AI? How might computers handle multiple languages at once?	LaC pp. 194-209	Writing Requirement due!
Week 14 4/15	Topic: Do Computers Endanger Languages? Summary: Why are so many human languages in danger of disappearing? Why is language technology “biased” against minority languages? Could technology be leveraged to revitalize endangered and extinct languages?	Reading on Canvas	
Week 15 4/22	Topic: How will Language Technology Determine My Future? Summary: Does the nature and quality of our life change with language technology? What aspects of your personal professional life might change with AI?	LaC pp. 215-219	Homework 6 (due Wed)
Week 16			FINAL EXAM

IV. Student Learning Outcomes (SLOs)

At the end of this course, students will be expected to have achieved the [Quest](#) and [General Education](#) learning outcomes as follows:

- **Content:** *Students demonstrate competence in the terminology, concepts, theories and methodologies. They identify, describe, and explain key themes, principles, and terminology; the history, theory and/or methodologies used; and social institutions, structures and processes within the discipline(s).*
 - Identify, describe and explain key theoretical terms and concepts that apply to languages around the world and the communities that speak them: syntax, morphology, written language, language endangerment, principles and politics of translation (**S**)
 - Identify and understand key structures and terms in computer science sufficiently well to explain how computers are able to store, represent, and process written and spoken data, e.g. Unicode, binary, classification, machine learning algorithms (**S, Quest 2**)
 - Identify endangered languages around the world and in the U.S.; explain how languages become endangered and why minority language communities remain under-served by technology (**Quest 2**)

Assessments: Exams, exercises, homeworks

- **Critical Thinking:** *Students carefully and logically analyze information from multiple perspectives and develop reasoned solutions to problems within the discipline(s). They apply formal and informal qualitative or quantitative analysis effectively to examine the processes and means by which individuals make personal and group decisions. Assess and analyze ethical perspectives in individual and societal decisions.*
 - Analyze the theory and practice of human language technology, including the scientific, commercial, and social goals for which it can be applied (**S, Quest 2**)
 - Critically examine and evaluate how the limitations and ethical challenges of the language technology may impact a speech community's educational, economic, and political involvement (**S, Quest 2**)
 - Evaluate the capabilities of a specific language technology system for processing a specific language or language variety, linguistic structure, or writing system used by a community around the world or in the U.S. (**Quest 2**)

Assessments: exercises, homeworks

- **Communication:** *Students communicate knowledge, ideas and reasoning clearly and effectively in written and oral forms appropriate to the discipline(s).*
 - Identify and explain in writing at least one current issue at the intersection of technology, language, and social science using concepts, terms, and ideas covered in this course (**S, Quest 2**)
 - Develop and analytically support one's own conclusions, and critically assess others' opinions, about the design, capabilities and behavior of human language and the technology that stores, represents, and processes languages (**S, Quest 2**)

Assessments: writing requirement, homeworks, exercises

- **Connection:** *Students connect course content with meaningful critical reflection on their intellectual, personal, and professional development at UF and beyond.*

- Connect the structures and concepts that are “under the hood” in language technology to other technology regularly encountered in adult and professional life (**Quest 2**)
- Reflect on social and ethical considerations related to language technologies and connect them to broader societal issues, such as privacy, equity, and the nature of artificial intelligence (**Quest 2**)
- Compare ways that technology can increase the threat to and also help maintain languages spoken by under-resourced communities around the world and in the U.S. (**Quest 2**)

Assessments: exercises, homeworks, writing requirement

V. Quest Learning Experiences

1. Details of Experiential Learning Component

Experiential learning connects the concepts, history, themes, and terminology covered by lectures and readings to concrete applications, or to related issues or skills that students encounter regularly in our lives. Most exercises in this course are experiential learning activities. For example, after learning how computers encode spoken language and what limitations computers have when processing spoken language, students will be challenged to “confuse” a voice recognition system such as Amazon Alexa. They will observe, analyze, and report the results.

Most homework assignments guide students through an experiential learning component. They assign activities that require interaction with a language and/or a technology. For example, after learning the complex relations between languages, students may be asked to provide a dictionary-based translation between two languages and compare that to the results of a machine translation system.

2. Details of Self-Reflection Component

Students will reflect on their learning process in writing or group discussions. Prompts will guide students to deepen their connection to their experiences with language technology. For example, after analyzing attempts to “break” an automatic speech recognition system, students will be asked to consider how this activity might relate to the everyday experience of non-native or “non-standard” speakers who are encountering technology trained on a limited variety of voices. Or, after applying grammar checkers to their writing drafts, students will reflect about their sense of confidence and agency when accepting or rejecting the computer’s suggestions.

The writing requirement also prompts students to reflect on and communicate their own and others’ feelings and reactions towards the design, capabilities, and behavior of human languages and the technology that processes them. Students should consider content from readings and lectures and explore social media or personal connections and examine social and ethical implications as they develop their essay topic.

VI. Required Policies

Attendance Policy

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Students Requiring Accommodation

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, *as early as possible*.

UF Evaluations Process

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “**We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code**”. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “**On my honor, I have neither given nor received unauthorized aid in doing this assignment.**” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Religious Observances

A student should inform the instructor if the religious observances of their faith will conflict with class attendance, tests or examinations, or other class activities. This should be done prior to the class or occurrence of that test or activity. We are obligated (and happy) to accommodate the student’s religious observances.

Counseling and Wellness Center

Contact information for the Counseling and Wellness Center: <http://www.counseling.ufl.edu/>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Collegial Environment

Students are encouraged to employ critical thinking and to rely on data and verifiable sources to interrogate all assigned readings and subject matter as a way of determining whether they agree with their classmates and/or their instructor. No lesson is intended to espouse, promote, advance, inculcate, or compel a particular feeling,

perception, viewpoint or belief. Students are encouraged to share their viewpoints, data, and sources in class and to speak with the instructor or classmates, in class or privately, about any perceived violation of this policy.

In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is defined as an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission by the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.