

## **Spoken Dialogue Systems**

CISE 4930/6930

Credits: 3

**Class Periods:** MWF 3:00-3:50pm

**Location:** CSE E222

**Academic Term:** Fall 2019

### **Instructor:**

Name: Kristy Boyer

Email Address: [keboyer@ufl.edu](mailto:keboyer@ufl.edu)

Office Phone Number: 352-575-8974 (mobile)

Office Hours: By appointment; CSE 430

### **Teaching Assistants:**

Please contact through the Canvas website

Mehmet Celepkolu, [mckolu@ufl.edu](mailto:mckolu@ufl.edu)

Office Hours: Monday between 4pm-5pm in CSE 430 or by appointment

### **Course Description**

Dialogue systems play an increasingly important role in our daily lives. In this course, we will learn step-by-step how spoken dialogue systems are created, including automatic speech recognition and generation, natural language understanding techniques, dialogue management and domain modeling, and voice user interface design. Students will work in groups to complete a project that applies and extends what they have learned in class. The course features an undergraduate and a graduate track. At the completion of the class, students will have a broad set of knowledge and skills that they can apply in any situation that involves processing natural language. The course format will consist of lectures, in-class discussions, and student presentations. Examinations will consist of material covered in lectures and projects.

### **Course Pre-Requisites / Co-Requisites**

Undergraduate data structures class or equivalent, or permission of the instructor.

### **Course Objectives**

At the end of this course, students will be able to:

- Design voice user interfaces and dialogue systems that follow best practices
- Compare and contrast different types of dialogue managers and dialogue personas
- Implement dialogue understanding pipelines including speech recognition; part of speech tagging; dialogue act tagging; response selection; and speech generation.
- Describe the current state of the art in commercial and research dialogue systems
- Annotate and conduct agreement studies on dialogue corpora
- Plan and execute the evaluation of a dialogue system or voice user interface

### **Materials and Supply Fees**

N/A

### **Required Textbooks and Software**

- *Speech & Language Processing, 3rd edition*, by Jurafsky & Martin. Print copy of this book is not yet available but online PDFs are available [here](#).

### **Optional Materials**

- *Voice User Interface Design* by Cohen, Giangola, Balogh

### Course Schedule

The course will begin by examining some of the underlying tenets of human-human dialogue, and then move on to an introduction to basic natural language processing. **The topics and order listed below are subject to change. Exam dates are guaranteed NOT to change. All students are required to attend class for project proposals, presentations, and exams.**

Date(s)	Topic(s) - approximate timeline subject to change	Tentative due dates (will be confirmed at least one week in advance of any due date)
8/21	Class overview. 1. <a href="#">Intro: what is a dialogue system?</a>	
8/23	Intro (continued) 2. <a href="#">The Linguistics of conversation</a>	
8/26*	Intro to dialogue development frameworks (Google, Amazon, Watson, etc.) & demo	
8/28	3. <a href="#">Deep overview of dialogue systems &amp; the mechanics of conversation (J&amp;M Dialogue chapter)</a>	
8/30	Deep overview of dialogue systems & the mechanics of conversation (J&M Dialogue chapter) continued	
9/2	NO CLASS - Labor Day	
9/4	Hurricane class cancellation	
9/6	Deep overview of dialogue systems & the mechanics of conversation (J&M Dialogue chapter) continued	<i>Deadline to form project teams &amp; notify teaching staff</i>
9/9	Voice user interface design, the mechanics of conversations (VUI Ch 10)	<i>HW1: Report on Using a Commercial Dialogue System (due 11:59pm on Monday 9/9)</i>
9/11	Finish VUI Ch 10 Voice user interface design: Personas and the role of your system (VUI Ch 6)	<i>HW2: Practice with stats &amp; evaluation of dialogue system data — removed from schedule due to hurricane schedule shift</i>
9/13	Voice user interface design: Iterative prototyping and the user-centered design process (Development, testing & tuning methodologies (VUI Ch 15))	
9/16	Speech Act Theory & Dialogue act labeling	<i>Deadline to submit written project proposal &amp; plan (see project proposal template) - Monday 11:59pm</i>
9/18*	Project proposal presentations - Date will NOT change	
9/20*	Inter-rater reliability (Kappa and related metrics)	<i>Feedback provided to project teams on their plans</i>

9/23	Statistics refresher for evaluation of dialogue systems	
9/25	Evaluating dialogue systems (collecting data to evaluate your system - during interaction and pre/post interaction) - manual labeling of corpora for evaluation	<i>HW3: Practice with dialogue act labeling and computing kappa</i>
9/27	An NLP view on dialogue systems and the state of the art from very recent literature, before diving deeply into how the components of dialogue systems work	
9/30	Going deeper with your evaluation data: PARADISE dialogue evaluation	<i>HW4: Design of evaluation questions and log-based data collection for your project dialogue system</i>
10/2*	EXAM 1 - Date will NOT change	
10/4*	NO CLASS - Homecoming	
10/7	Review exam Introduction to NLP (J&M Ch 1)	
10/9*	Project working day -- complete working prototype of your dialogue system and implementation of your data collection framework	
10/11*	Evaluation round robin -- everybody's system gets tested by classmates and you get evaluation data to analyze!	
10/14	Introduction to NLP continued (J&M Ch 1)	
10/16	Regex, Text Normalization, & Edit Distance (J&M Ch 2)	
10/18	N-gram language models (J&M Ch 3)	
10/21	N-gram language models continued (J&M Ch 3)	<i>Evaluation writeup of your prototype dialogue system due</i>
10/23	Vector semantics (J&M Ch 6)	
10/25	Vector semantics (J&M Ch 6) continued	
10/28	Neural networks & neural language models (J&M Ch 7)	<i>HW5: Practice on J&amp;M chapters 1-3</i>
10/30	Neural networks & neural language models (J&M Ch 7) continued	
11/1	POS Tagging (J&M Ch 8)	<i>HW6: Practice on J&amp;M Ch 3-4</i>
11/4	POS Tagging (J&M Ch 8) cont	
11/6	Sequence processing with recurrent networks (J&M Ch 9)	

11/8	Sequence processing with recurrent networks (J&M Ch 9) cont	<i>HW7: Practice on J&amp;M Ch 7-8</i>
11/11	NO CLASS Veteran's Day	
11/13	Discourse Coherence (J&M Ch 21)	
11/15	Discourse Coherence (J&M Ch 21) cont	
11/18	EXAM 2	
11/20	Question Answering (J&M Ch 23)	
11/22	Question Answering (J&M Ch 23) cont	<i>HW 8: Practice on J&amp;M Ch 9 and 21</i>
11/25	Deeper topics TBD	
11/27	NO CLASS Thanksgiving break	
11/29	NO CLASS Thanksgiving break	
12/2	Evaluation round robin Part 1	
12/4	Evaluation round robin Part 2	
		<i>Project reports due 12/10 along with 3-5 minute video presenting the results. Every member of your team must participate in the video. Introduce yourselves by name. You may do a voice-over slideshow, or a video of yourselves showing slides. Or something fancier. :)</i>
12/12	<b>Final Project Presentations</b> 5:30-7:30PM	These final presentations have been replaced by a 3-5 minute video showing your system and presenting your results. It is due on 12/10. Slip days are permitted if ALL members of your group have slip days remaining. Otherwise, no slip days.

### ***Attendance Policy, Class Expectations, and Make-Up Policy***

You are expected to actively engage in the course throughout the semester. You must come to class prepared by completing all out-of-class assignments. This preparation gives you the knowledge or practice needed to engage in higher levels of learning during the live class sessions. If you are not prepared for the face-to-face sessions, you may struggle to keep pace with the activities occurring in the live sessions, and it is unlikely that you will reach the higher learning goals of the course. Similarly, you are expected to actively participate in the live class. Your participation fosters a rich course experience for you and your peers that facilitates overall mastery of the course objectives. Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>) and require appropriate documentation. No electronic devices of any kind are permitted during tests. Make-up tests will be given only in

the event of an absence excused as per university policy. Any make-up test will be comprehensive and will be held after the final day of class.

## **Projects**

Each student must complete a term project as part of a group. This project will involve implementing a fully functional dialogue system or voice user interface. In order to ensure progress is made throughout the semester, several presentations will be made by project teams. First, they will propose their projects and receive approval and/or feedback from the teaching staff regarding scope and plans. Second, teams will provide a project waypoint update in which they present their incremental progress. When the dialogue systems are complete, students will bring demo versions to class for an evaluation “round robin” which will facilitate data collection for evaluating the dialogue system using techniques learned in class. Both types of projects require a project writeup formatted in a computer science conference paper format of the team’s choosing. The final project writeup must be between 8-10 pages in length. For systems projects, it will include a description of the system and its evaluation results. Source code, data, processing scripts, and raw results of statistical analyses must be available upon request but are NOT to be included in the 8-10 page writeup. Final project presentations will be held during the final examination period as indicated in the course schedule below.

## **Late Policy and Homework “Slip” Days**

Late assignments will not be accepted. The student will receive a grade of zero on an assignment if it is not received on or before the due date. However, at the beginning of the semester, each student will be issued two “slip days,” which can be applied to homework exercises. Homework exercises are given in class and do NOT include project proposals, final reports, presentations, tests, or assignments whose due date is listed below in the course schedule. When applied, one slip day provides one 24-hour extension on an assignment, with no grade penalty. No explanation is required regarding the reason for using the slip day.

Procedure for applying a slip day:

1. Submit the homework up to 24 hours past the due date (which will use up one slip day) or up to 48 hours past the due date (which will use up two slip days).
2. Email the TA to notify him that you are applying your slip day(s). Make the title of the email “CISE 4930/6930: [INSERT NAME] - Slip Day for [ASSIGNMENT NAME]”. No additional explanation is required.
3. After both slip days have been used up, any late assignments of any type will receive a grade of zero.

Because extenuating circumstances can occur at any time, it is strongly recommended that students NOT use their slip days in avoidable circumstances. Students who have already used their slip days will not be permitted to turn in late assignments, and the late assignment will receive a grade of zero. Late assignments due to excused absences require the use of slip days unless prior arrangements are made.

## **Evaluation of Grades**

<b>Assignment</b>	<b>Percentage of Final Grade</b>
Exam #1	15%
Exam #2	15%
Project Proposal	5%
Project prototype writeup/evaluation	10%
Final project writeup/evaluation	15%
Final project presentation	8%
Homeworks	30%
BONUS for participating in research studies*	2%

\*As part of this course, you are eligible to earn extra credit by participating in up to 2 CISE human-subjects research studies. Each study participated in will be worth 1-2%, and students can earn up to 2% extra credit on their final course grade. Participation in human-subjects studies will be handled by the CISE department's Research Participant System which can be accessed at <https://ufl-cise.sona-systems.com>. To view and sign up for a study, log in to the system using your GatorLink username and password. Once you have successfully logged in, you will be able to see a list of studies with available timeslots. If there are no studies listed, there are currently no opportunities to participate, and you should check back later. Since the system works on a first-come basis, it is recommended you do not wait until the end of semester when the number of timeslots is limited.

If you schedule an appointment for a study, it is your responsibility to show up or cancel at least 24 hours before the appointment. Multiple unexcused absences will lock you out of the system. In addition, it is your responsibility to assign earned credits to the correct course. At the end of the semester, your instructor will be provided a history of your participation for grading purposes. For assistance with the Research Participation System, please view the Frequently Asked Questions located at [https://ufl-cise.sona-systems.com/faq\\_view.aspx](https://ufl-cise.sona-systems.com/faq_view.aspx). Participation in studies is optional, but strongly encouraged. A replacement extra credit activity of a 500 word essay discussing the two biggest strengths of this course and two areas for improvement will be accepted. It is possible that no extra credit opportunities will be available this semester if no studies are recruiting. In this case, essays will not be accepted.

#### ***Grading Policy***

Percent	Grade	Grade Points
93.0 - 100.0	A	4.00
90.0-92.9	A-	3.67
87.0 - 89.9	B+	3.33
83.0 - 86.9	B	3.00
80.0 - 82.9	B-	2.67
77.0 - 79.9	C+	2.33
73.0 - 76.9	C	2.00
70.0 - 72.9	C-	1.67
67.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	F	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

#### ***Students Requiring Accommodations***

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

#### ***Course Evaluation***

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks

of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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.

### ***Academic Integrity***

A student shall be guilty of a violation of academic integrity if he or she:

- Represents the work of others as his or her own.
- Obtains assistance in any academic work from another individual in a situation in which the student is expected to perform independently.
- Gives assistance to another individual in a situation in which that individual is expected to perform independently.
- Offers false data in support of laboratory or field work.

Any violation associated with an examination or quiz will result in a failing grade for the course. Project-related offenses may incur a reduction of up to the equivalent of two letter grades in the course grade. Homework-related offenses will incur a grade of a negative 100% on the assignment along with further penalties. All violations will be reported to the Office of the Dean of Students, which may impose penalties beyond those by the instructor.

### ***Plagiarism***

The Code of Student Conduct defines plagiarism as "submitting written materials without proper acknowledgment of the source" or "deliberate attribution to, or citation of, a source from which the referenced material was not in fact obtained." Instances of plagiarism will be treated as violations of academic integrity and will be dealt with as described above.

### ***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### **Student Privacy**

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### **Campus Resources:**

#### *Health and Wellness*

##### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

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

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

## Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus**: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process>.