

# CS 630: Cognitive Systems

## Course Syllabus

### General Information

Instructor: Dr. Dario Salvucci  
Email: [salvucci@drexel.edu](mailto:salvucci@drexel.edu)

### Student Learning Information

#### *Course Description*

This course explores the principles of cognition and intelligence in humans and machines, focusing on how to build computational models that, in essence, think and act like people. In the course we will (1) review existing frameworks for modeling human cognition, including broad categories of symbolic, connectionist, and hybrid frameworks; (2) study a particular framework in the context of illustrative psychological domains (e.g., memory, attention, language); (3) build running simulation models of cognition and performance using this framework; and (4) explore how such models can be employed in real-world application domains such as intelligent tutoring and driving.

*College/Department:* CCI, Department of Computer Science

*Repeat Status:* Not repeatable for credit

*Prerequisites:* CS 510 [Min Grade: C] or CS 530 [Min Grade: C]

*Credits:* 3 hours of lecture (3 credits total)

#### *Course Purpose within a Program of Study*

This course serves primarily as an elective for the MS Computer Science, MS Software Engineering, and PhD Computer Science degree programs. The official prerequisites for the course are CS 510 or CS 530. In general, students should have a solid foundation in programming concepts and algorithms, knowledge of the Java programming language, and some basic understanding and appreciation of issues regarding artificial intelligence.

#### *Statement of Expected Learning*

The course objectives are to:

- Review existing frameworks for modeling human cognition, including broad categories of symbolic, connectionist, and hybrid frameworks;
- Study a particular framework in the context of illustrative psychological domains (e.g., memory, attention, language);
- Build running simulation models of cognition and performance using this framework;
- Explore how such models can be employed in real-world application domains such as intelligent tutoring and driving.

As learning outcomes, students completing this course should be able to:

- Understand the purpose and design of cognitive architectures;
- Implement running simulation models of cognition and performance using a modern cognitive architecture;

- Explain how models of cognition are employed in real-world application domains such as intelligent tutoring and driving.

## Course Materials

### *Required and Recommended Texts, Readings, and Resources*

There is no required textbook for this course; the lecture notes handed out in class will serve as the primary study resource, and we may hand out additional sources during the term. Readings will also be distributed as needed. Please also note that there are many freely available Web resources and these will be pointed out as appropriate.

### *Required and Supplemental Materials and Technologies*

Students will implement cognitive models in a modern cognitive architecture (e.g., ACT-R). All required applications and development environments will be made available at the start of the course. Students will also occasionally implement task interfaces in the Java programming language.

## Assignments, Assessments, and Evaluations

### *Graded Assignments and Learning Activities*

Homework assignments will center on developing computational models of human behavior. This work will include both Java programming (for the task simulation and data collection) and "programming" of models using a cognitive architecture (e.g., ACT-R).

**Collaborative work is not permitted for assignments or exams.**

Work submitted after the specified deadline will incur a penalty of 33% per day late. Plagiarism and other academic misconducts will be dealt with seriously: in the case of a violation, the assignment or exam in question will receive a grade of zero, the student may receive up to one letter grade penalty on their final course grade, and the violation will be reported to the department, college, and university.

Students are responsible for checking Blackboard Learn and Drexel email daily for course announcements. If you have any questions about a project or assignment, please email the instructor at least 24 hours before the deadline.

For more details, please refer to The Drexel University Student Handbook.

### *Grading Matrix*

Grades will be assigned based on the following:

- Assignments: 70%
- Final Exam: 30%

### *Grade Scale*

The following scale will be used to convert points to letter grades:

Points	Grade	Points	Grade	Points	Grade
Exceptional	A+	82-86.99	B	70-71.99	C-
92 and up	A	80-81.99	B-	67-69.99	D+
90-91.99	A-	77-79.99	C+	60-66.99	D
87-89.99	B+	72-76.99	C	0-59.99	F

Note that the instructor may revise this conversion if/when necessary.

## Course Schedule

[This schedule is tentative and may change during the course.]

Week	Notes
1	Introduction
2	Cognitive Architectures
3	Perception & Action
4	Declarative Learning
5	Procedural Learning
6	Multitasking
7	Neural Modeling
8	Complex Tasks
9	Applications
10	Recent Advances

## Academic Policies

This course follows university, college, and department policies, including but not limited to:

- Academic Integrity, Plagiarism, Dishonesty and Cheating Policy: [http://www.drexel.edu/provost/policies/academic\\_dishonesty.asp](http://www.drexel.edu/provost/policies/academic_dishonesty.asp)
- Student Life Honesty Policy from Judicial Affairs: <http://www.drexel.edu/provost/policies/academic-integrity>
- Students with Disability Statement: <http://drexel.edu/oed/disabilityResources/students/>
- Course Add/Drop Policy: <http://www.drexel.edu/provost/policies/course-add-drop>
- Course Withdrawal Policy: <http://drexel.edu/provost/policies/course-withdrawal>
- Department Academic Integrity Policy: <http://drexel.edu/ci/resources/current-students/undergraduate/policies/cs-academic-integrity/>
- Drexel Student Learning Priorities: <http://drexel.edu/provost/assessment/outcomes/dslp/>
- Office of Disability Resources: [http://www.drexel.edu/ods/student\\_reg.html](http://www.drexel.edu/ods/student_reg.html)

The instructor(s) may, at his/her/their discretion, change any part of the course before or during the term, including assignments, grade breakdowns, due dates, and schedule. Such changes will be communicated to students via the course web site. This web site should be checked regularly and frequently for such changes and announcements.

Students [requesting accommodations](#) due to a disability at Drexel University need to request a current Accommodations Verification Letter (AVL) in the [ClockWork database](#) before accommodations can be made. These requests are received by Disability Resources (DR), who then issues the AVL to the appropriate contacts. For additional information, visit the DR website at <http://drexel.edu/oed/disabilityResources/overview/> , or contact DR for more information by phone at 215.895.1401, or by email at [disability@drexel.edu](mailto:disability@drexel.edu).