**Introduction to Cognitive Science**

**COGS 100**

**Winter 2023**

**Grading Scheme**

| **Grade Categories** | **Grade** |
| --- | --- |
| **Quizzes** | **15%** |
| Online Quizzes 1, 2, and 3, equally distributed |  |
| **Assignments** | **20%** |
| Assignment 1 Individual: Summary and mind map | 10 |
| Assignment 2 Group: Logic and cognitive modelng | 10 |
| **Exams** | **65%** |
| Midterm | 25% |
| Final Exam 3 hours | 40% |

**Grading Method**

A *“numbers in, letters out”* method will be used. Marks will be posted as numerical percentage. The final course numerical grade will be converted to a letter grade based on Arts and Science Grading Scheme.

**Late Policy**

Assignments must be submitted by the posted due date. Late submissions will be accepted until the posted end date on OnQ. 1% will be subtracted from the total course mark for each day past the due date.

**Accommodations**

For any special accommodations, students MUST upload approved official accommodation letters on OnQ through assignment submission (details on OnQ). Without approved letters NO accommodation will be provided.

**Calculator Policy**

Calculators can be used during quizzes, tests and examinations which have the basic calculating functions required by most Arts and Science courses. For this purpose, the use of the **Casio 991** series calculator is permitted and is the **only approved calculator for Arts and Science students**. This calculator can be bought from the Queen's Campus Bookstore, Staples and other popular suppliers of school and office supplies.

**General Information**

Check the [school website](https://www.cs.queensu.ca/students/undergraduate/syllabus/year2021-22.php) for standard information about the following:

(<https://www.cs.queensu.ca/students/undergraduate/syllabus/year2021-22.php>)

* **Turnitin Statement**
* **Academic Integrity**
* **Copyright of Course Materials**
* **Accessibility Statement**
* **Accommodations Statement and Academic Considerations for Extenuating Circumstances** 
  + ***No accommodation will be given for time zone*** as students are expected to attend the classes in person.
* **Statement of the Location and Timing of Final Examinations**

## **Weekly Syllabus**

### **Week 1: What is Cognitive Science and Course Overview**

#### **Topics**

Unit 1 starts. Cognitive Science: A Multidisciplinary Study, Cognitive Theory, Turing Machine and Mind as a Computational Process, Related Disciplines

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Introduction forum

### **Week 2: COGS Disciplines and Relevant Concepts from Philosophy, Psychology, Neuroscience**

#### **Topics**

Unit 2 starts. Multidisciplinary Perspectives of Mind from Philosophy, Psychology, Neuroscience.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Create topic summary – definition and example for each concept definition

### **Week 3: COGS Disciplines and Relevant Concepts from Neuroscience, Linguistics, Anthropology**

#### **Topics**

Multidisciplinary Perspectives of Mind from Neuroscience, Linguistics and Anthropology or evolution.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Consult previous final exam questions
* Assignment 1 posted

### **Week 4: COGS Disciplines and Relevant Concepts from Anthropology, Artificial Intelligence**

#### **Topics**

Unit 2 ends. Multidisciplinary Perspectives of Mind from Anthropology or evolution, and Artificial Intelligence.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Forum post of a definition with an example
* Online Quiz 1 due

### **Week 5: Cognitive Processing, Modeling, and Representation of Information in the Mind – Logic, Rule**

#### **Topics**

Unit 3 starts. How is information represented in the mind so that it can be processed by mental processes? What are the outcomes of the processes? Seven different mental representations to be studied. Formal logic and representations to simulate mental processing on the machine for cognitive modeling.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Attend Logic tutorial and solve logical processing using formal logic representations
* Solve example logic problems
* Complete Prolog tutorial

### **Week 6: Cognitive Processing and Representation of Information in the Mind – Concept and Analogy**

#### **Topics**

#### Other mental representations to process thought and action – concepts and analogy.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Write an example of a mental process and corresponding mental representation needed by the process.
* Prepare for midterm

### **Week 7: Cognitive Processing and Representation of Information in the Mind – Image Network**

#### **Topics**

#### Other mental representations to process thought and action – mental image and network.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Midterm due

### **Week 8: Mental Model and Mental Processes**

#### **Topics**

#### Unit 3 ends on representations and Unit 4 starts on mental processes. Humans tend to use mental model for mental processing. Example of logic and Wason Card.

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Describe your own retrospection of a mental process of recognizing a friend after 15 years.

### **Week 9: Memory, Vision**

#### **Topics**

#### How is information retained in the mind and processed? How does our visual system work? How can we focus our attention efficiently?

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Solve the problem of finding the fake coin or playing a computer game. What mental representation did you use? What were your thought processes? Describe.
* Online quiz 2 due

### **Week 10: Problem Solving and Decision Making and Social Behaviour**

#### **Topics**

#### How do we solve problem and make decisions? How do we behave socially and why?

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Assignment 2 due.

### **Week 11: Cognitive Modeling**

#### **Topics**

#### Unit 5 starts. Create a computational model of the mind – simulate mental processes, logic programming and artificial neural networks

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Prepare to submit Assignment 1 – create a mind map.

### **Week 12: Cognitive Architecture**

#### **Topics**

#### Implementation of computational model requires programming framework or a cognitive architecture. Types of cognitive architecture and Artificial General Intelligence (AGI) – can that be a reality some day?

#### **Readings**

Textbook Chapter and additional online material.

#### **Activities**

* Online quiz 3 due
* Tutorial for final exam.
* Assignment 1 due.