

Topic: Logic Basics (1 hour lecture)

Learning Objectives:

1. Distinguish between a valid statement and an invalid statement.
2. Determine the truth value of a statement.
3. Describe the five basic logical connectives.
4. Recognize the key words in English for the corresponding logical connective.
5. Give an example of using each logical connective.
6. Translate a logical sentence into an English sentence.
7. Translate an English sentence into a logical sentence.
8. Construct a truth table for each logical connective.

Pre-class activities:

1. Structure:
 - a. Step I: you should prepare ahead of time using hybrid resources: textbook, lecture notes, video, etc.
 - b. Step II: you will complete the pre-class exercises, which will be graded Pass/Fail on the basis of completeness, effort, and timeliness.
 - c. Step III: you will need to write down all the questions you have after the first two activities and bring them to class for Q&A.
2. Step I: With our learning objectives in mind, do one of the following or all:
 - a. Read our discrete structure textbook
 - b. Read the lecture notes provided online
 - c. Watch the video; or
 - d. Computer simulation
3. Step II: Do the pre-class exercises.
4. Step III: Write down your questions.

Opening minutes (10 minutes): Give a quick review, evaluate quiz results, answer questions, asking questions.

Main activities (40 minutes):

1. LO1: give an exercise for students to point out which are valid or invalid statements
 - a. 5 minutes
 - b. Prepare slide of clicker questions
2. LO6, LO7: give an exercise for students to identify the key logical words, and translate back and forth between English sentences and logical statements
 - a. 10 minutes

- b. Students work in pair. Both students list all the key logical words. One student picks one or more logical word and ask the other student to write down the logical statement. One student writes down a logical statement and the other translate it back to English.
 - c. Instructor will walk around to listen to each group.
 - d. Instructor will give some exercises for the whole class.
3. LO8: ask student to write down the truth table for each connective
 - a. 5 minutes
 - b. Each student will write down the truth table for each connective and share and compare with the neighbors.
4. LO2, LO4, LO6, LO7, LO8: give an exercise for students to determine the truth values of simple/complex statements.
 - a. 20 minutes
 - b. Students break into larger groups (e.g., 4 to 5 students per group) for solving multiple problems. Each group is responsible for solving a different problem. When they have more time, they can work on more problems. By the end, each group will need to present their answers on the board.

Closing minutes: Summarize, synthesize, solicit questions. (10 minutes)