

# CSC0056: Data Communication

## Lecture 10: Multiaccess Communication

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# Course information



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Acknowledgement: Some slides' materials in this course are borrowed with permission from the 2014 edition of the course taught by Prof. Yao-Hua Ho 賀耀華

Figures are obtained from the textbook available at <http://web.mit.edu/dimitrib/www/datanets.html>



# Outline of lecture10

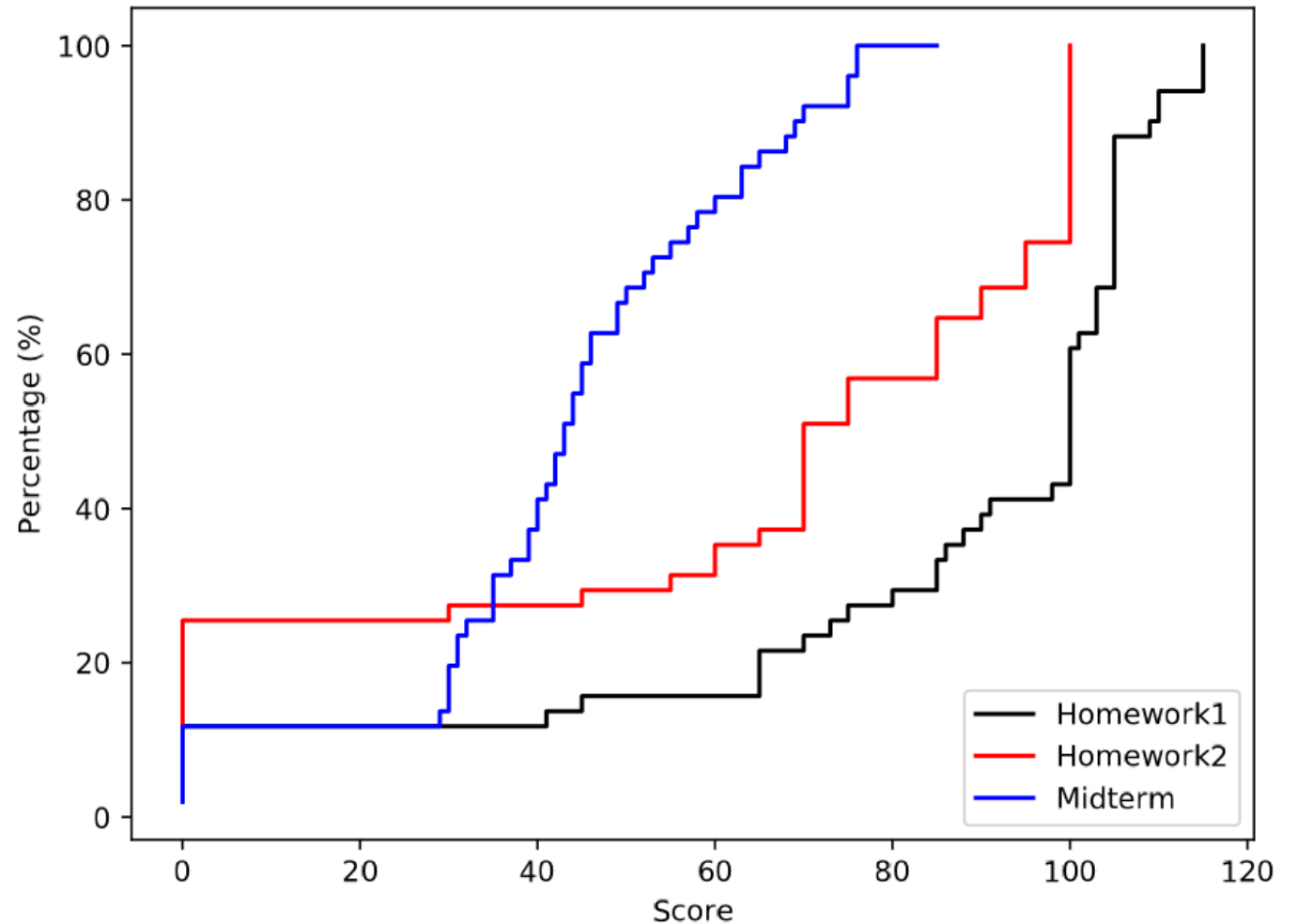
- Midterm result Q&A
- On effective study skills
- Multiaccess communication
  - Types of multiaccess communication strategies
  - Slotted Aloha protocol and its analysis

# Outline of lecture10

- **Midterm result Q&A**
- On effective study skills
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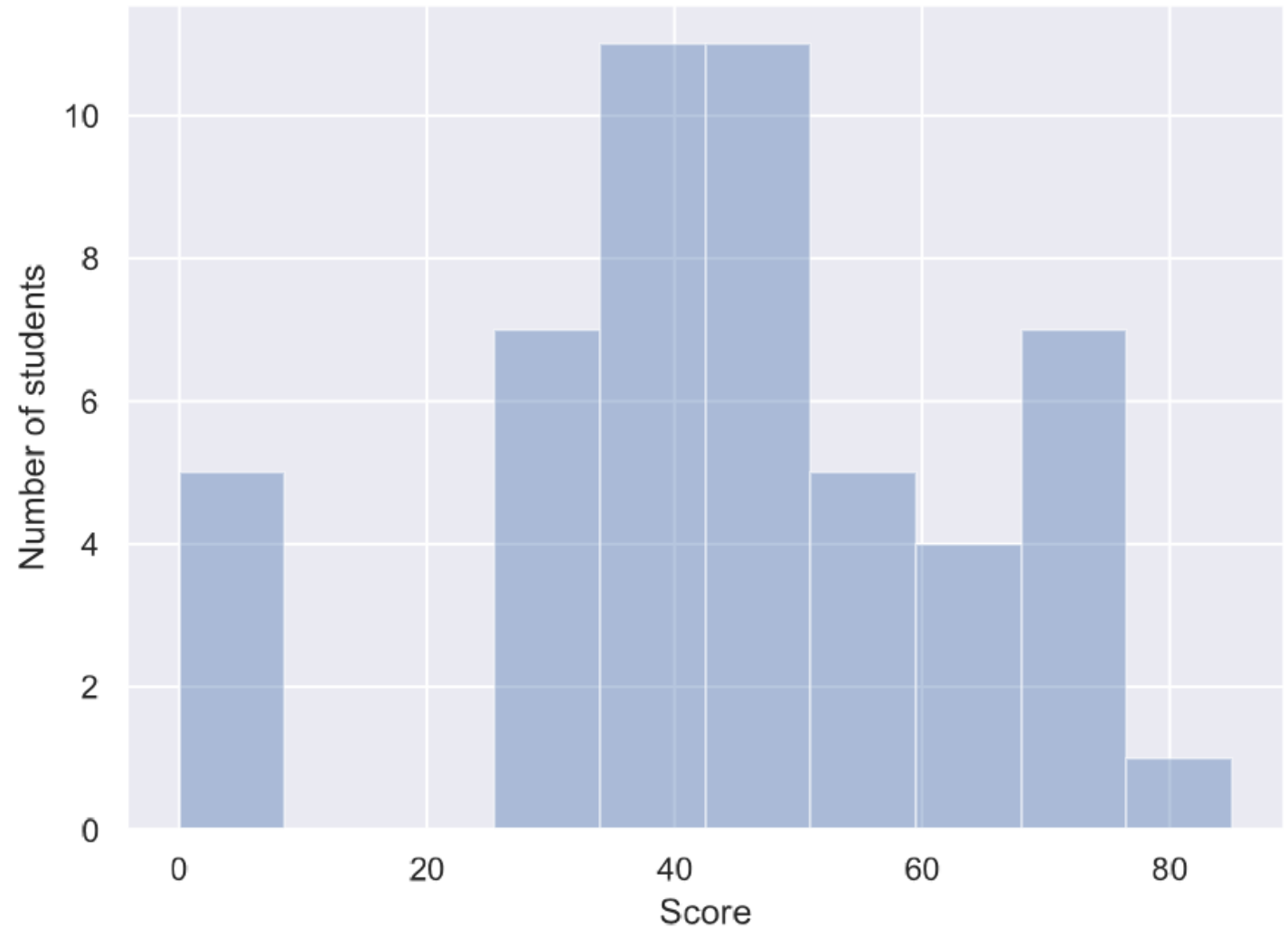
# Statistics of raw midterm score (blue curve)

- Highest score = 85
- Average score  $\approx 44$
- About 80% of students got score lower than 60
- About 40% of students got score lower than 40



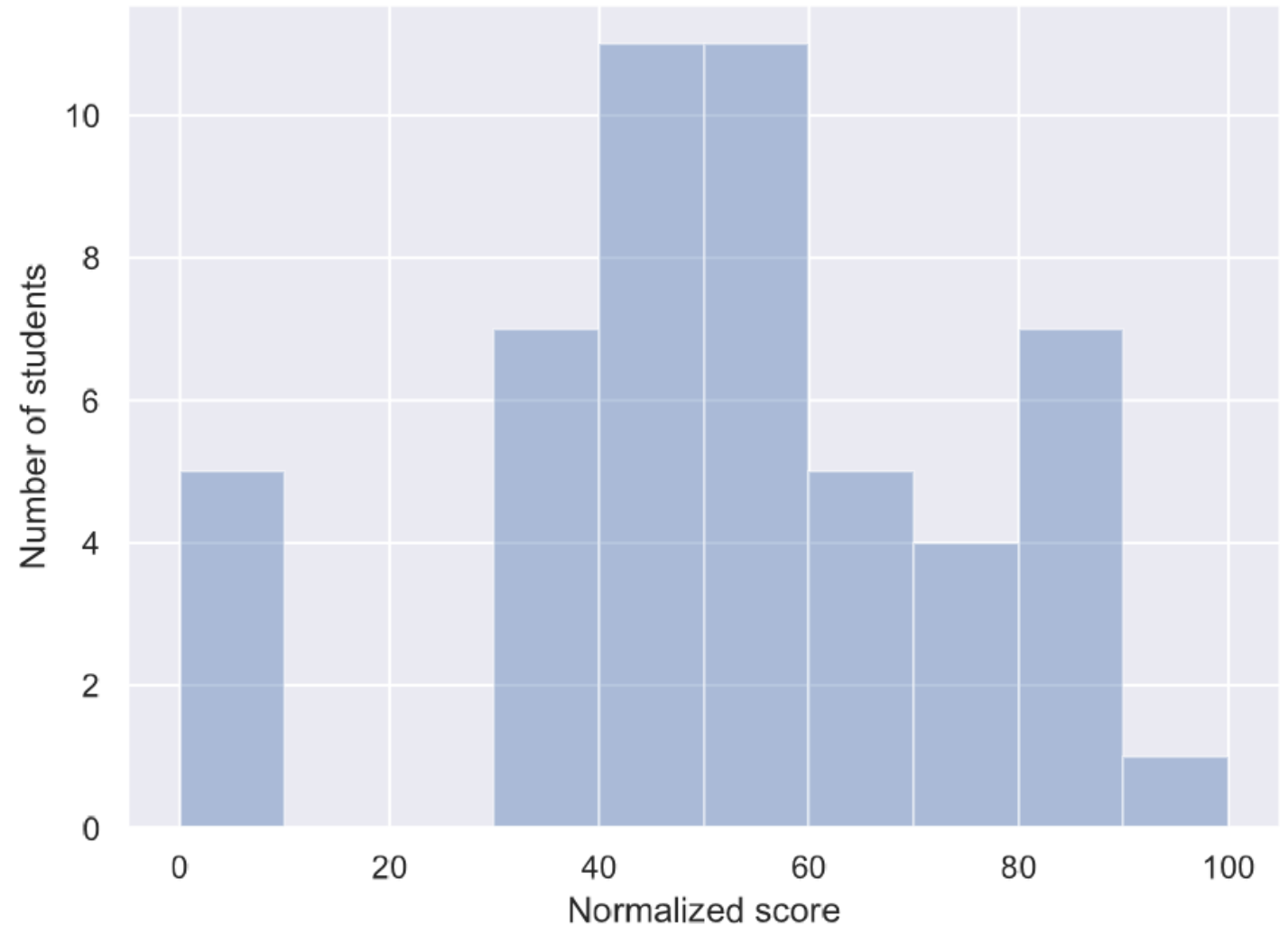
# Statistics of raw midterm score (cont.)

- 12 students scored higher than 60
- 5 students did not attend the exam (score = 0)



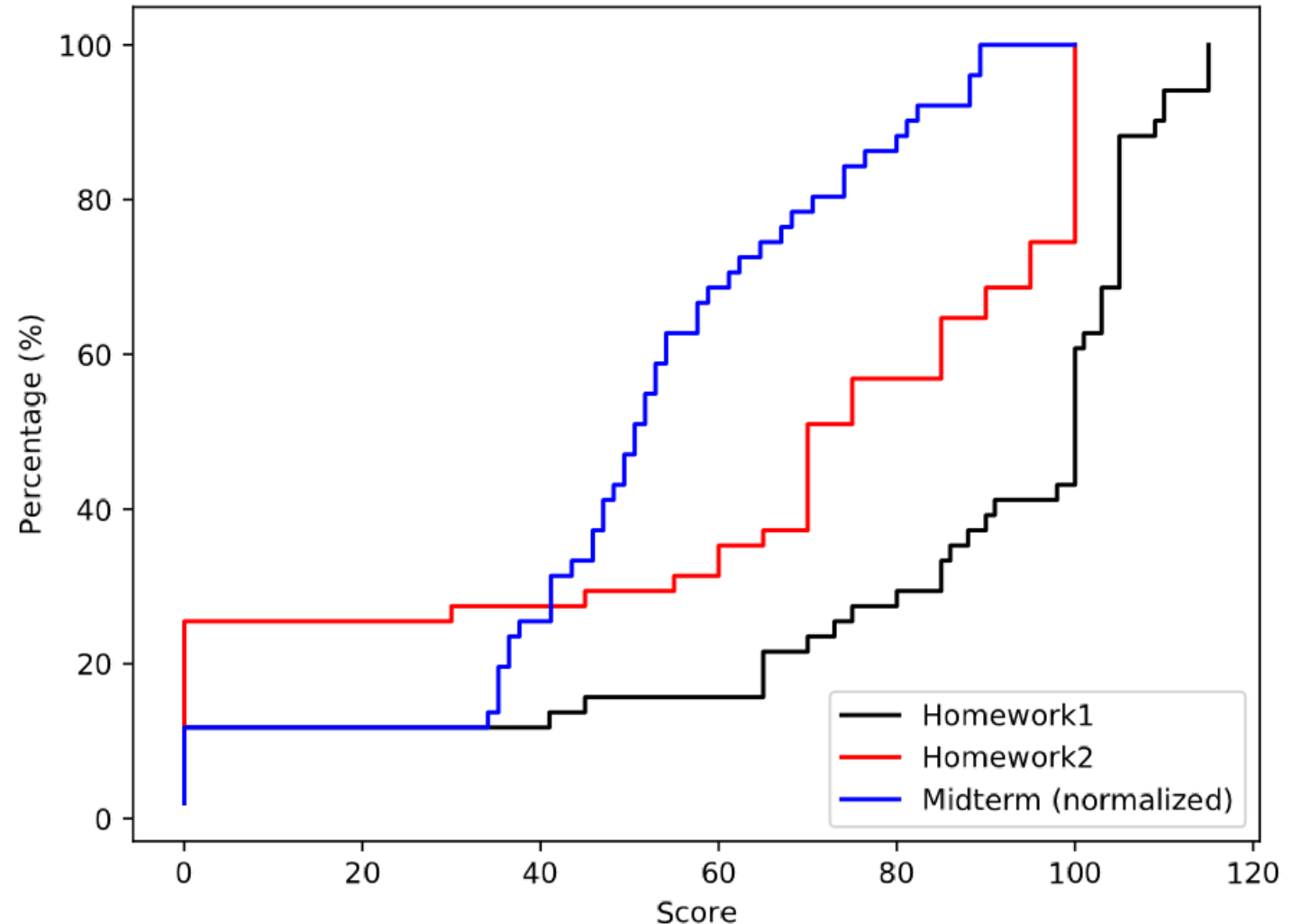
# Statistics of normalized midterm score

- To access students' relative performance
- Method: normalize to the highest score
  - 85  $\rightarrow$  100
  - $\Rightarrow$  multiply each student score by  $100/85$ , i.e.,  $\times 1.176$



# Observations from the normalized score

- About 50% of students got score within the 50% of the highest score
- I think it is reasonable to make some linear adjustment to all nonzero midterm scores
  - Shifting all scores by the same offset value





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# Some observation of the class

- All-English lectures/exam made the course more challenging
- Student feedbacks say that lecture notes do help them in learning
- Homework exercises do help
  - Many students received full scores for the ARQ questions, good!
  - Many students got the CRC questions wrong (because no homework for that?)
- The reading assignments are critical parts of learning process!

# Learning in the era of abundant online data

- Critical thinking is more important than it ever does
- My vision:
  - the instructor's role is more about to teach **skills** than to teach **content**
  - the students are to learn to critique than to memorize
- Data communication protocols are evolving with ideas recycled/reused
  - Learn the ideas behind example protocols!

# Elements of effective learning

- Preview the materials
- Grasp definition and terminology
- In-class discussion
- Idea comparison and contrast
- Homework assignments
- Further reading
- Teach!

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- Midterm result Q&A
- On effective study skills
- **Multiaccess communication**
  - **Types of multiaccess communication strategies**
  - **Slotted Aloha protocol and its analysis**

# Multiaccess communication 101

- In many real-world data networks, there will be multiple senders trying to send data over one single medium
- Example: wireless communication over the same radio frequency

# Types of multiaccess communication

- Case 1: Free-for-all
  - People seek opportunities to say something
  - Example: chatting over lunch between friends
- Case 2: Scheduled
  - Each person/party is given a pre-allocated amount of time to speak
  - Example: a presidential election debate
- Case 3: Turn-based
  - Pass around the microphone, and the person who get the mic may talk
  - Example: experience sharing in a small group

# Types of multiaccess communication

- Case 1: Free-for-all
  - Pros:
  - Cons:
- Case 2: Scheduled
  - Pros:
  - Cons:
- Case 3: Turn-based
  - Pros:
  - Cons:



# In-class group discussion

- Students' response:

Case 3: Turned-based  
set the nice value for  
Pros: each client with its own turn  
to get access to the base.  
Cons: If clients don't need the resource  
there will be a latency time  
when they get their turns.

Case 2: scheduled <sup>circuit switching</sup>  
Pros: guaranteed get opportunity in certain  
amount of time. ✓ TDM FDM  
Cons:  
1. need to spend time to scheduled. ✓  
2. someone may waste time ✓  
3. someone may not get enough time ✓

Case 1: Free-for-all  
Pros: Easy to construct this model, because  
you don't need to know many following data will  
come how ✓  
Cons: If the first in data is too large, it will  
take lots of time to change to the others, because  
Jamming others have to wait it complete.

# To be continued

- We will continue our discussion on multiaccess communication in the next lecture.
- In particular, we will introduce design and analysis of a classic communication protocol named *slotted Aloha*, a precursor of the modern Ethernet protocol.
- Stay tuned!