

# SER 321 C Session

**SI Session**

**Thursday, June 13th 2024**

*6:00 pm - 7:00 pm MST*

# Agenda



OSI Model Review

Threads!

Threading Pitfalls

Dining Philosophers

Concurrency Structures

Threading your Code

# SI Session Expectations

Thanks for coming to the **SER 321** SI session. We have a packed agenda and we are going to try to get through as many of our planned example problems as possible. This session will be recorded and shared with others.

- If after this you want to see additional examples, please visit the drop-in tutoring center.
- We will post the link in the chat now and at the end of the session.
  - [tutoring.asu.edu](https://tutoring.asu.edu)
- Please keep in mind we are recording this session and it will be made available for you to review 24-48 hours after this session concludes.
- Finally, please be respectful to each other during the session.

# Interact with us:

## Zoom Features



### Zoom Chat

- Use the chat feature to interact with the presenter and respond to presenter's questions.
- Annotations are encouraged

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TCP/UDP

**OSI Model**

*Check out the recording for the solution!*

Data	Application	
Data	Presentation	
Data	Session	
Segment	Transport	
Packet	Network	
Frame	Data Link	
Bits	Physical	

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## OSI Model

HTTP(s), SMTP, FTP, IMAP,  
POP, etc.

*Check out the recording for the solution!*

Data	Application	
Data	Presentation	
Data	Session	
Segment	Transport	
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**OSI Model**

LLC, MAC, data transmission  
in LAN

*Check out the recording for the solution!*

Data	Application	
Data	Presentation	
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## OSI Model

Signal, Binary transmission

*Check out the recording for the solution!*

Data	Application	
Data	Presentation	
Data	Session	
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Bits	Physical	



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## OSI Model

AuthN, authZ, session mgmt

*Check out the recording for the solution!*

Data	Application	
Data	Presentation	
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**OSI Model**

IP address, routing and  
delivery

*Check out the recording for the solution!*

Data	Application	
Data	Presentation	
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**OSI Model**

Translation, compression,  
encryption

*Check out the recording for the solution!*

Data	Application	
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## OSI Model

*Check out the recording for the solution!*

Data	Application	
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## OSI Model

Data	Application	HTTP(s), SMTP, FTP, IMAP, POP, etc.
Data	Presentation	Translation, compression, encryption
Data	Session	AuthN, authZ, session mgmt
Segment	Transport	TCP/UDP
Packet	Network	IP address, routing and delivery
Frame	Data Link	LLC, MAC, data transmission in LAN
Bits	Physical	Signal, Binary transmission

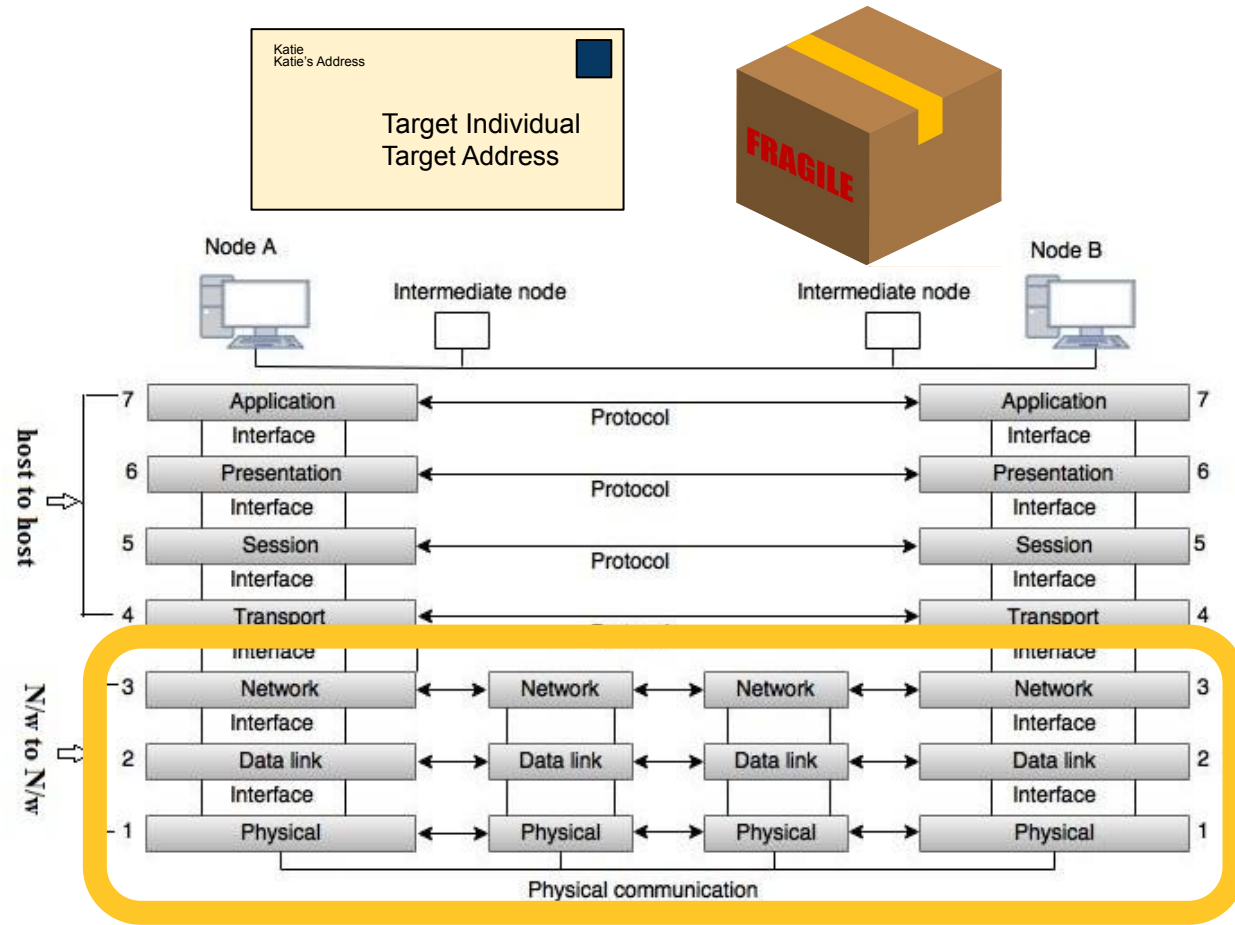


Fig: OSI Model

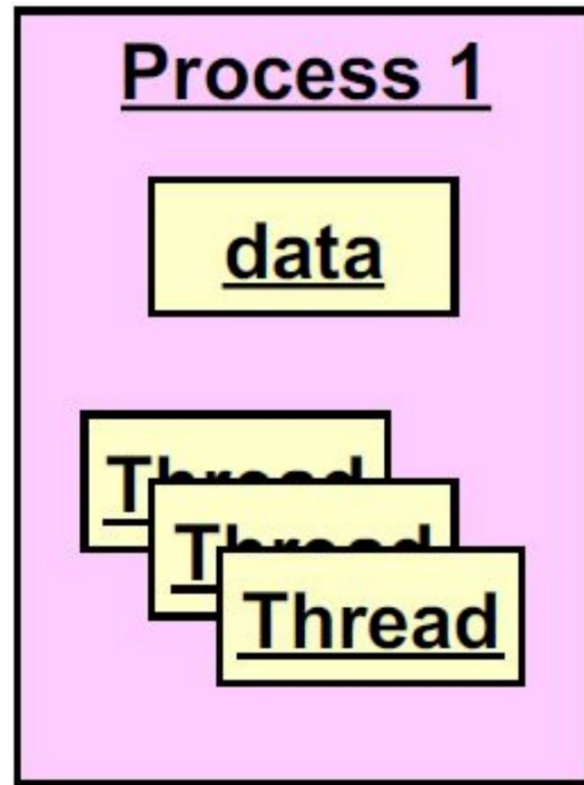
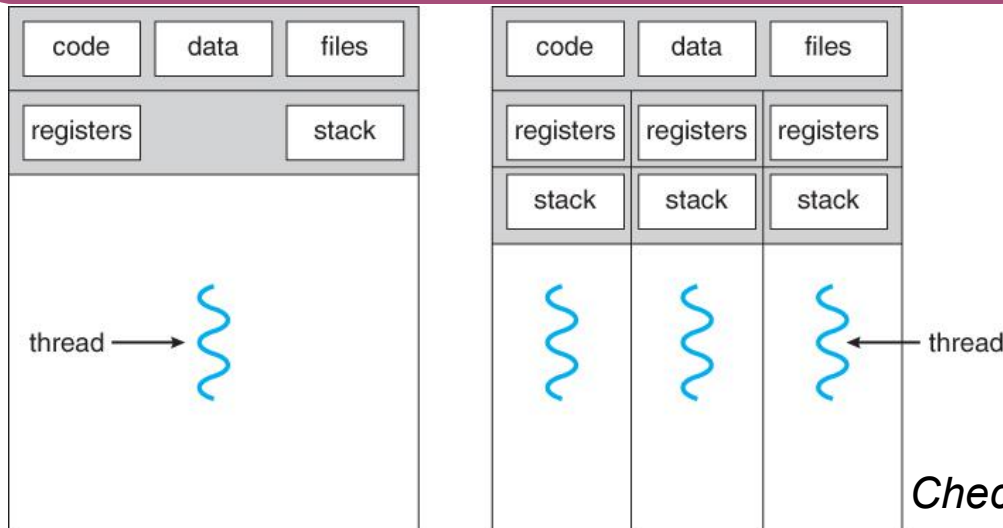
*Check out the recording for the discussion!*

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## Threads

What does that imply?

Remember that they exist *within* the parent process



Check out the recording for the discussion!

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## Threading Pitfalls

*Check out the recording for the solution!*

Race Condition

A thread never gains access to the resource it needs

Starvation

A thread is only able to acquire some of the resources it needs

Deadlock

More than one thread accesses a single resource at the same time

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## Threading Pitfalls

As the project name implies, we encounter a **deadlock**.

But what happened?

```
class SockClient {  
    public static void main (String args[]) throws Exception {  
        Socket      sock = new Socket( host: "localhost", port: 8888);    //Any IP name  
  
        ObjectInputStream in = new ObjectInputStream(sock.getInputStream());  
        ObjectOutputStream out = new ObjectOutputStream(sock.getOutputStream());  
  
        String s = (String) in.readObject();  
        out.writeObject("Back at you");  
  
        in.close();  
        out.close();  
        sock.close();  
    }  
}
```

Client

```
class SockServer {  
    public static void main (String args[]) throws Exception {  
  
        int count = 0;  
        ServerSocket      serv = new ServerSocket( port: 8888);  
  
        Socket sock = serv.accept();  
  
        ObjectInputStream in = new ObjectInputStream(sock.getInputStream());  
        ObjectOutputStream out = new ObjectOutputStream(sock.getOutputStream());  
  
        String s = (String) in.readObject();  
        System.out.println("Received " + s);  
        out.writeObject("Back at you");  
        System.out.println("Received " + s);  
  
        in.close();  
        out.close();  
        sock.close();  
    }  
}
```

Server

```
PS C:\ASU\SER321\examples_repo\ser321examples\Threads\NetworkDeadlock> gradle  
server  
<=====--> 75% EXECUTING [1m 33s]  
> :server  
█
```

*Check out the recording for the discussion!*

```
PS C:\ASU\SER321\examples_repo\ser321examples\Threads\NetworkDeadlock> gradle  
client  
Starting a Gradle Daemon, 1 busy and 1 stopped Daemons could not be reused, use  
--status for details  
<=====--> 75% EXECUTING [53s]  
> :client  
█
```



SER 321  
Threading Pitfalls

What does *Spaghetti Consumed* represent?

What does *Thinking* represent?

What does *Hungry* represent?

Check out the recording for the solution and discussion!

powered by NetLogo

Dining Philosophers

File: New Revert to Original

Export: NetLogo HTML

Mode: Interactive    Commands and Code: Bottom

model speed ticks: 6712

num-philosophers 12

setup    go    go once

hungry-chance 0.5

full-chance 0.5

☐ cooperation?

Spaghetti consumed

Philosopher ID	Spaghetti
0	100
1	80
2	100
3	100
4	80
5	100
6	100
7	80
8	100
9	100
10	100
11	100

Resource allocation

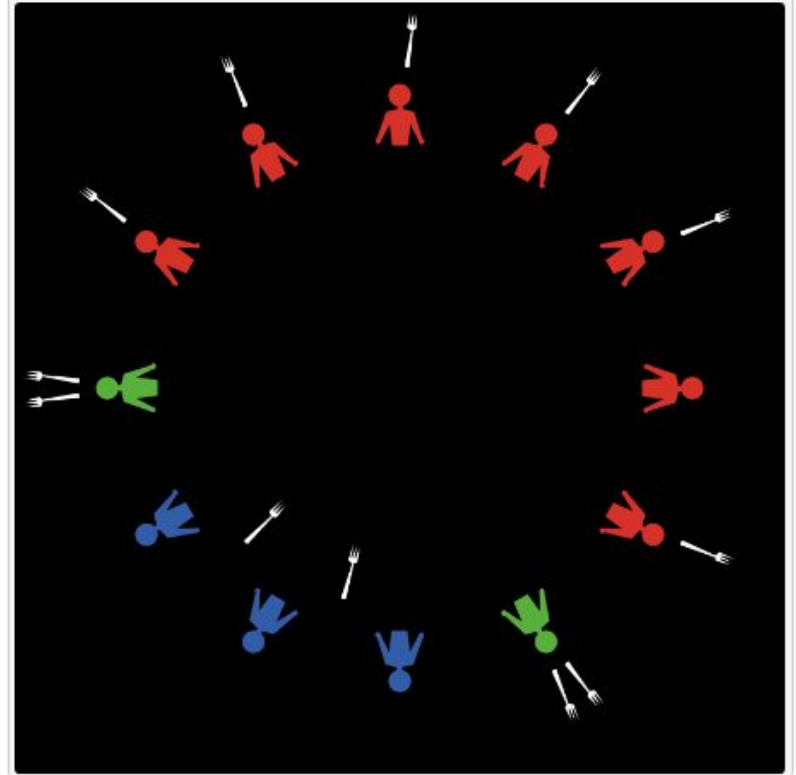
Time	Thinking	Hungry	Eating
0	12	0	0
2.5k	~8	~4	~0
5k	~8	~4	~0

*Check out the recording for the solution and discussion!*

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**Threading Pitfalls**

Can we take a guess at what happened here?



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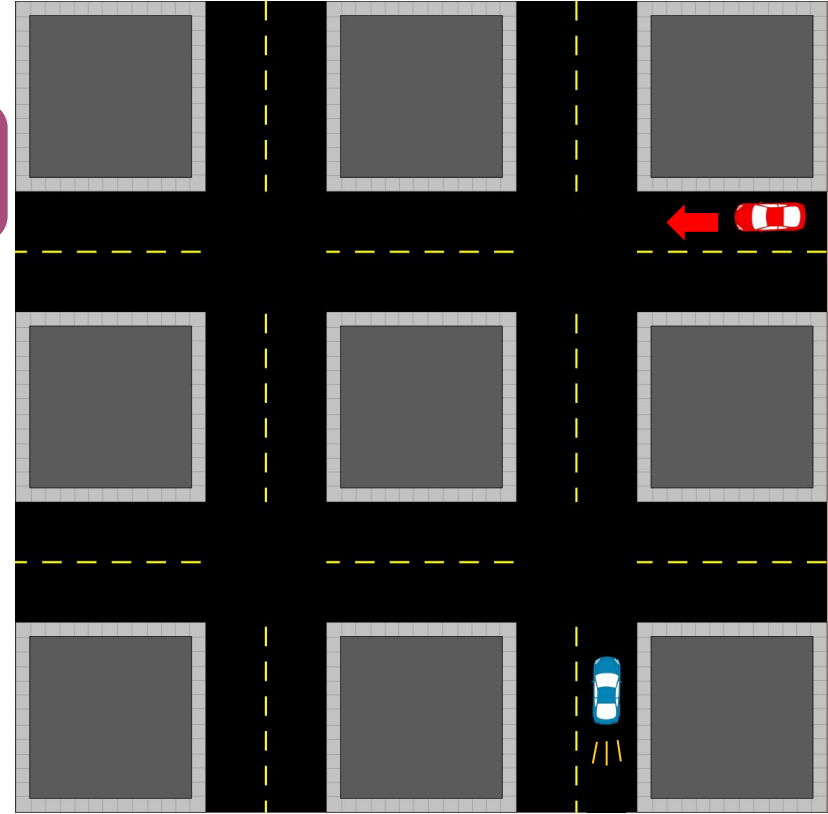
## Threading Pitfalls

*Check out the recording for the discussion!*

Race Condition

Crash

More than one thread accesses a single resource at once



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## Threading Pitfalls

*Check out the recording for the discussion!*

Race Condition

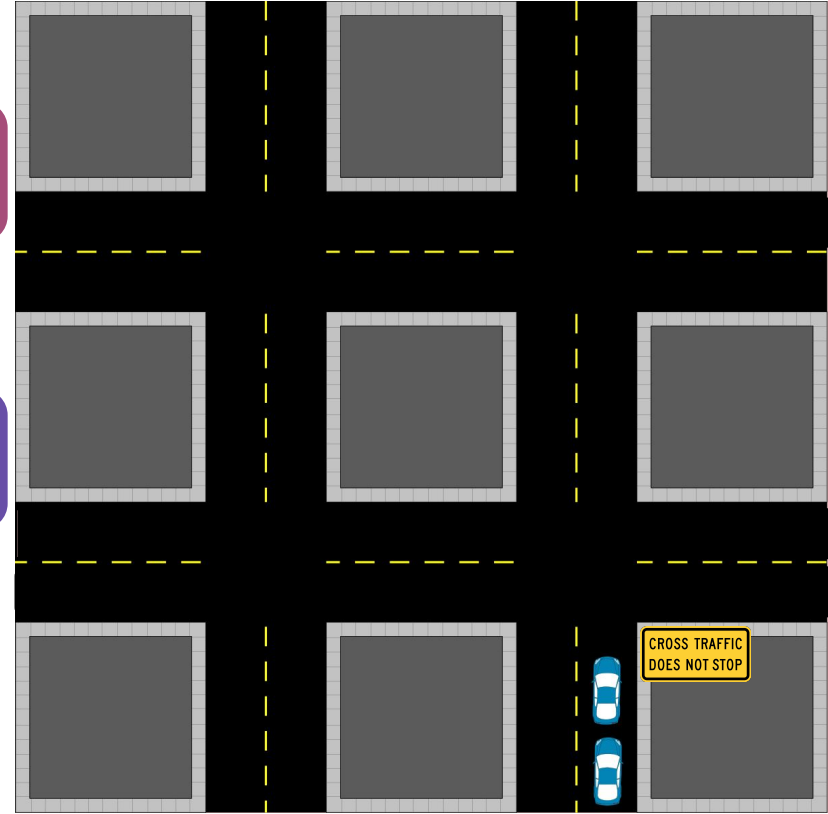
Crash

More than one thread accesses a single resource at once

Starvation

Cross Traffic

A thread never gains access to the resource it needs



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## Threading Pitfalls

*Check out the recording for the discussion!*

Race Condition

Crash

More than one thread accesses a single resource at once

Starvation

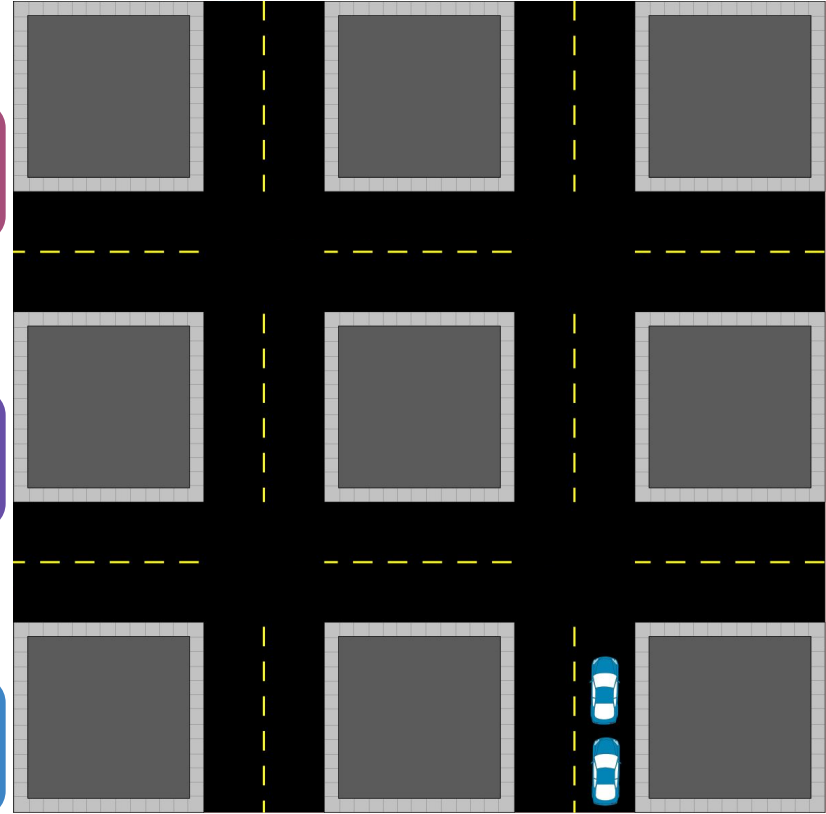
Cross Traffic

A thread never gains access to the resource it needs

Deadlock

Gridlock

A thread is only able to acquire some of the needed resources



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**Scratch Space**

# Questions?



## Survey:

<http://bit.ly/ASN2324>



## Upcoming Events

### SI Sessions:

- Sunday, June 16th at 6:00 pm MST
- Monday, June 17th at 6:00 pm MST
- Thursday, June 20th at 6:00 pm MST

### Review Sessions:

- Review Session - **Wednesday**, July 3rd at 6:00 pm MST (2 hr Session)
- Q&A Session - Sunday, July 7th at 6:00 pm MST (Final Session)



# More Questions?

Check out our other resources!

tutoring.asu.edu



## Academic Support

Academic Support Network (ASN) provides a variety of free services in-person and online to help currently enrolled ASU students succeed academically.

### Services



#### Subject Area Tutoring

Need in-person or online help with math, science, business, or engineering courses? Just hop into our Zoom room or drop into a center for small group tutoring. We'll take it from there.

[Need help using Zoom?](#)

[View the tutoring schedule](#)

[View digital resources](#)

Go to Zoom



#### Writing Tutoring

Need help with undergraduate or graduate writing assignments? Schedule an in-person or online appointment, access your appointment link, or wait in our drop-in queue.

[Access your appointment link](#)

[Access the drop-in queue](#)

Schedule Appointment



#### Online Study Hub

Join our online peer communities to connect with your fellow Sun Devils. Engage with our tools to search our bank of resources, videos, and previously asked questions. Or, ask our Tutorbot questions.

Now supporting courses in Math, Science, Business, Engineering, and Writing.

Online Study Hub

1-

Go to Zoom

2-

[Need help using Zoom?](#)

[View the tutoring schedule](#)

[View digital resources](#)






1. Click on 'Go to Zoom' to log onto our Online Tutoring Center.
2. Click on 'View the tutoring schedule' to see when tutors are available for specific courses.

# More Questions?

## Check out our other resources!

[tutoring.asu.edu/online-study-hub](https://tutoring.asu.edu/online-study-hub)

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[University College](#)

## Online Study Hub

Online peer communities for students and tutors, YouTube channels, and Tutorbots.



### What are online peer communities?

Individual courses have an online peer community that allows you to connect with your peers to post and answer questions and to develop study groups.



### How can tutoring center videos help?

Videos can help supplement the learning you're doing in and outside of class and include step-by-step methods for how to understand concepts.



### How does the Tutorbot work?

You can ask the Tutorbot questions about course concepts and the Tutorbot will recommend additional resources and examples to help address your questions.

Select a subject

- Any -

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**Business**


### ACC 231

Uses of Accounting Info I

 [Peer Community](#)

### ACC 241

Uses of Accounting Info II

 [Peer Community](#)

### CIS 105

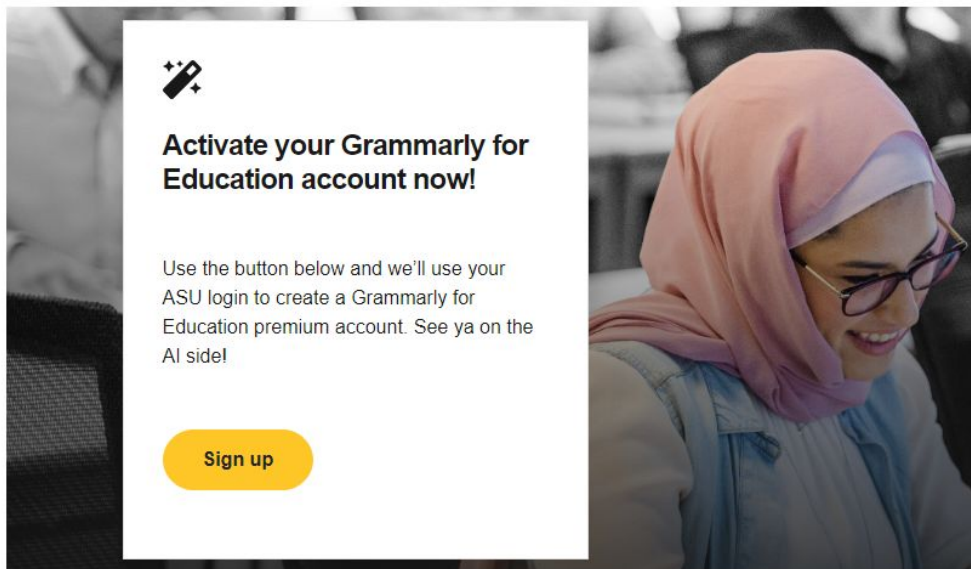
Computer Applications and Information Technology

 [Peer Community](#)

Don't forget to check out the Online Study Hub for additional resources!

# Expanded Writing Support Available

Including Grammarly for Education, at no cost!



[tutoring.asu.edu/expanded-writing-support](https://tutoring.asu.edu/expanded-writing-support)

\*Available slots for this pilot are limited

## Additional Resources

- [Course Repo](#)
- [Gradle Documentation](#)
- [GitHub SSH Help](#)
- [Linux Man Pages](#)
- [OSI Interactive](#)
- [MDN HTTP Docs](#)
  - [Requests](#)
  - [Responses](#)
- [JSON Guide](#)
- [org.json Docs](#)
- [javax.swing package API](#)
- [Swing Tutorials](#)
- [Dining Philosophers Interactive](#)
- [Austin G Walters Traffic Comparison](#)