

# Java Graphics

Slides derived from the work of  
Dr. Amy McGovern and Dr. Deborah Trytten

# How Do I Control How a Panel is Rendered (at a pixel level)?

- Extend the component
- Override:
  - `protected void paintComponent(Graphics g)`
  - Draw your graphics inside `paintComponent`
  - This method is called autonomously using event handling & **never in your own code**

# Drawing in the right spot

Remember to manage your coordinates

- Where is 0,0?
- How “tall” is the screen?
- How “wide” is the screen?
- Which way is positive x? Positive y?
- Are coordinates relative or absolute?

# Drawing Images

- `ImageIcon` is fixed size
  - Rendering: `ImageIcon.paintIcon()`
  - Example ...
- `Image` is flexible
  - Rendering: `Graphics.drawImage`

# Drawing shapes

Graphics class provides a LOT of useful drawing utilities \*\*\*

- Drawing icons
  - Icon.paintComponent()
  - Example
- Primitive shapes: drawLine, drawArc, drawRect, drawString, ...
  - Can do fill versions of those too
  - Example...

# Graphics Words/Strings

- `drawString` draws the string
- `Font` class: can select the font
- `FontMetrics` class: managing fonts
  - Can measure the extent of a String before it is displayed
  - Use to center text automatically
- Example...

# Drawing shapes

Graphics2D provides more operations:

- draw(Shape s)
- Define a general shape and draw it to the screen
- Examine Shape API (and Graphics2D API)
- Example....

# Adding Animation

Need:

- An object to keep track of where the item you are drawing is
  - `paintComponent()` will use this information to properly place the object
- Control loop to update its coordinates
- Sleep between animation frames:
  - `Thread.sleep(ms)`
- Don't forget to call `repaint()`!

# Adding Animation: Alternative

Need:

- Use a Timer to trigger the control loop  
(coming soon)

# Example

- Make a bouncing smiley ...

# Example

- What do you want to draw/animate?

