Max 6 (also known as Max/MSP/Jitter)

User Interface Basics:
- **Command+N**: File/New Patcher

- A Max file is called a patcher
- A network of objects connected by patch cords within a patcher is called a patch

- **View menu**: Show or hide different UI elements
- **Toolbar**: bottom of Max window
- **Max 6 Toolbar (Max 6 demo installed in Media Arts Lab)**:
  - Lock/Unlock: Make your patch editable or non editable
  - Patcher Windows:
    - Show Object Explorer: Open window to choose from all available objects
    - Show Key Commands
    - Presentation Mode: Display your patch
    - Inspector: Edit attributes
    - Enable Debugging: Troubleshoot errors in your patcher
    - Show/Hide Grid
    - Mixer: Show/hide mini mixer for patchers with audio objects
    - Show/Hide Status Bar
    - Open/Close Sidebar
      - Explorer Settings, View By Icon, View By Name, Show/Hide Object Details, Create Selected Object, Help, Reference

- **Max 5 Toolbar (Max 5 installed in Sound Lab)**:
  - Lock/Unlock: Make your patch editable or non editable
  - New Object: Create new object
  - Zoom: Zoom in or out of patch
  - Presentation Mode: Display your patch
  - Inspector: Edit attributes
  - Bring Forward/Send Backwards: Move your objects forward or backwards on Z axis
  - Show/Hide Grid
  - Enable/Disable Snap to Grid

- Objects are grouped by category in **Sidebar/Explorer**:
  - All, UI Objects, Max, MSP, Jitter, Reference
- Objects can be scaled horizontally (drag in bottom right corner of object) and moved within patcher window
- Cut, Copy and Paste can be used to create multiple instances of objects
- Objects have inlets and outlets which are indicated by little black boxes on the top/bottom of the object
  - Inlets/outlets can be connected by patch cords by clicking and dragging from one to another
  - Click on arrow halfway down patch cord/Align to automatically align patch cords
    - Drag double arrows up/down to modify patch cord routing

- **Shift+Command+H**: Right click on an object/Open Help or Help/Open Help
  - Help files are standalone patchers that demonstrate how an object works
  - Help/Max/MSP/Jitter Tutorials are also a great resource
- Use See Also for related object help files

- **Shift+Command+R**: Right click on an object/Open Reference or Help/Open Reference
- Description, Arguments, Messages, Attributes, Menu Items, Output, Examples, See Also

- **Toolbar/Show Key Commands**:
  - **B**: Button
  - **C**: Comment
  - **F**: Float number box
  - **I**: Number box
  - **J**: Jitter object
  - **L**: Live object
  - **M**: Message box
  - **N**: New object
  - **P**: Show Explorer
  - **Shift+P**: Presentation Object
  - **T**: Toggle

**Basic UI Objects:**

- **button**: Blink and send a bang
  - Provides visual feedback of an action and is used to trigger other messages and processes
  - Click to send bang
  - Any message or number triggers bang output
- **toggle**: Switch between off and on (0/1)
  - Sends a 0 as output when turned off and 1 when turned on
  - When giving input, a non-zero number will turn it on, a 0 will turn it off and a bang will alternate the state of the toggle
- **message**: Send any message
  - Displays and sends any given message with the capacity to handle specified arguments
- **number**: Display and output a number
  - Displays, inputs and outputs integer numbers
- **flonum**: Display and output a floating point number
  - Displays, inputs and outputs floating point numbers
- **object**: A new Max object
  - Select and input object name to bring up:
    - Text Completion, Name Matches, Descriptions and Tags
- **slider**: Move a slider to output values
  - Resembles a sliding potentiometer (dimmer switch), outputting numbers restricted to a specified range, offset by a specified number and multiplied by a specified number
  - Range can be set in Inspector or Max window

**Other Important Objects:**

- **metro**: Output a bang message at regular intervals
  - Interval (number) argument specifies time in milliseconds; send number to right inlet to specify
  - Send a bang to the left inlet to start/stop
- **print**: Print any message in the max window
  - Prints any input into the Max window for debugging, messaging or analysis purposes
- Command+M: Window/Max Window (also available in Sidebar)

- Math Objects:
  - +: Add two numbers and output the result
  - -: Subtract two numbers and output the result
  - *: Multiply two numbers together and output the result upon receiving input in the left inlet
  - /: Divide two numbers (according to the specified divisor assignment) and output result

- Comparison Objects: Output 1 if true, 0 if false
  - >: Greater than
  - >=: Greater than or equal to
  - ==: Equal
  - !=: Not equal
  - <=: Less than or equal to
  - <: Less than

- random: Generate a random number
  - Outputs random numbers within the range between 0 and 1 less than the argument specified
  - Bang left inlet to get random number
  - Set range via right inlet

- imovie: Play a movie in a user-interface object within the patcher window

- Messages for imovie Object:
  - border $1: Draw a border around the movie display area
  - read: Load movie file with optional filename argument
    - Must be in same directory as patcher
  - gettime: Send the current movie time out the object’s left outlet

- Transport Controls:
  - number: Set current time location (Quicktime units)
  - start: Start playback
  - stop: Stop playback
  - pause: Pause playback
  - resume: Resume playback
  - next: Move ahead number of Quicktime units

- Speed and Time:
  - rate 0: Play at default speed
  - rate 1: Stop playback
  - rate 1 2: Two numbers specify a fractional playback rate
  - rate -1.5: Play in reverse at faster speed
  - length: Send movie length out the object’s left outlet
  - time: Send current movie time out the object’s left outlet

- Looping:
  - loop $1: Turn looping on/off
  - loopstart: Set the loop start (default 0)
  - loopend: Set the loop end (default is end of movie)
  - loopset: set both start and end
  - palindrome $1: Set the looping mode (normal or palindrome)

- makenote: Generate a note-on/note-off pair
  - Outputs a MIDI note-on message paired with a velocity value followed by a note-off message after a specified amount of time. This allows for generative MIDI output without having to manage note-off generation
- **kslider**: Output numbers from an onscreen keyboard
  - Connect outlet with inlet of makenote to send MIDI notes
  - number sent to left inlet sets pitch and starts a note
    - 0 is lowest note, 127 is highest note
  - number sent to middle inlet sets velocity (volume)
    - 0 is silent, 127 is maximum velocity
  - number sent to right inlet sets note duration in milliseconds
- **clear**: Cancel future note-offs
- **stop**: Send all note-offs out now
- **Arguments (optional)**: velocity, duration, channel
  - Left outlet sends pitch MIDI number
  - Right outlet sends velocity of currently playing note

- **noteout**: Transmit MIDI note messages to a MIDI device
  - Double click to see available MIDI ports:
    - **AU DLS Synth 1**: Play notes using Max’s built in MIDI device
    - **IAC Driver Bus 1**: Send notes to other MIDI application (Garageband, Logic, etc)
      - See notes on enabling IAC Driver
  - Left inlet can receive MIDI note on/off messages or from makenote
  - Middle inlet receives note velocity (volume)
  - Right inlet receives note channel