Green Screen is a technique for compositing two images or frames. The composite is achieved by layering the two images on top of each other and removing the background color from the topmost image to reveal the image below. Achieving a successful green screen requires careful attention to lighting and software filters that remove or “key” the green background. This worksheet will cover how to light your subject for green screen and composite the footage in Final Cut Pro.

CLOTHING
1. Make sure your subject is not wearing green. Anything green will be transparent in the final composite.

LIGHTING
2. You should think about your lighting in two parts, the screen and the subject. The subject can be lit however you like, as long as no shadows are cast onto the green screen. You may want to try to match the lighting conditions of the scene into which you plan to composite your subject. The green screen should be lit as evenly as possible. The green screen process works by using software to remove a single color. If you have shadows on your green screen you end up with more than one shade of green and an ineffective key. Below is a diagram of a recommended lighting setup.

The backlights should be placed approximately at a fifteen degree angle to the screen. Make sure that there aren’t any hot spots or shadows. Be sure not to under or over-light the screen. You are not trying to change the gray value of the screen, you only want to accentuate the green color. The image on the top is too bright, the center is too dark, and the bottom is correct. A good way to tell if your screen is evenly lit is to use the zebra exposure in your view finder. You don’t have to worry about lighting the entire frame. The green screen only needs to extend as far as your subject’s range of motion.
3. Now it’s time to light your subject. Place the subject about three feet in front of the green screen to avoid any shadows and make sure that his clothes or face are not reflecting the green screen. Now position your key light. Typically the key light is positioned somewhat off the camera-to-subject axis. The key light should be high enough so that the nose shadow falls down, not across the face. The standard key is 45 degrees above the subject. Make sure the key light is not causing the subject to cast any shadows onto the green screen.

Next let’s position the fill light. The main function of the fill light is to fill in the shadows produced by the key without casting distinct shadows of its own. Fill lighting is almost always softer than the key. It is usually created with a soft light fixture or a bounced spotlight. If the fill light emanates from a point close to the camera’s lens and at the same level, its shadows will not be visible to the camera. The fill is generally placed on the opposite side of the camera from the key.

4. Shoot your movie. Any format and frame rate will work. Make it the best movie ever.

**FINAL CUT PRO**

Four-point Garbage Matte

5. Capture your footage and convert it to ProRes 422. Import your ProRes footage into a Final Cut Pro timeline. For more on how to convert your footage to ProRes see the HVRDR60_FCP_Workflow starter guide in the Film, Video, New Media Faculty Staff group on the portal. Place your green screen footage in a new sequence. We are going to apply several filters to achieve our key: Color Smoother, Four-point Garbage Matte, and Primatte RT.

6. The Color Smoother improves the quality of chroma keys and reduces diagonal “stair-stepping” that can occur in video clips with areas of high-contrast color. You will want to use 4:2:2 Color Smoothing for ProRes video. As you add additional keying filters, make sure that the Color Smoothing filter remains the first one in the video section of the Filters tab. To add the Color Smoothing Filter click the Effects tab in the Browser. Expand the Video Filters directory and the Key directory inside. Select Color Smoothing - 4:2:2 and drag it onto the clip in your timeline. Double-click your clip. You should now see the Color Smoothing filter under the Filters tab in your viewer. The filter has been applied.
Next let’s apply a Four-Point Garbage Matte. The purpose of the Garbage Matte is to minimize the area that needs to be keyed by cropping the edges of the frame. To apply the Four-Point Garbage Matte select the Effects tab in the Browser. Expand the Video filter then the Matte directories. Locate the Four-Point Garbage Matte. Drag and drop the Four-Point Garbage Matte onto the clip in your timeline. Double-click the timeline to see that it has been applied.

You only need the area of the frame that contains the actor’s range of motion. Scroll through your clip to find the farthest reaches of the frame they enter. Now it’s time to set the points. Click the crosshair on the first point in the Viewer to activate the cropping tool and click again in the Canvas to crop. The points are positioned clock-wise from the left corner. To reposition a point simply re-click it in the viewer and reposition in the Canvas.
Now we can apply the final filter, Primatte RT. Before you apply Primatte RT you might want to drop in your background to get an idea of how the final composite will look. Make sure to place the background layer below the green screen video.

Apply the Primatte RT filter by selecting the Effects tab in the Browser. Expand the Video Filters directory. Inside Video Filters expand the Key directory and locate Primatte RT. Drag and drop the filter onto the green screen clip in your timeline.

In the viewer change the Output type to Foreground. Click the Backing Color eyedropper then click on a green area inside your clip. This selects the shade of green to remove. Switch back to Processed Foreground and you will see the keyed result. Your subject will probably be reddish-purple looking. We will need to make some adjustments to the key.

Switch the Output Type to Matte. Drag the Noise Removal slider and Matte Density slider down to zero. Your image should go totally black. Slowly drag the Matte Density slider up until you have a solid white silhouette of your subject. If you go too far you will start to get a solarized effect and if you have not gone far enough parts of your background will be white. Get as close as you can and if needed pull up the Noise Removal slider to fine tune. You should end up with something like this.
9. Return the Output type to Processed Foreground. If your background is largely one shade (in this case it’s mostly red) you can change the replacement color from gray to match the background. If you don’t have a predominant color in the background skip to the next step. To change the replacement color click to activate the Replacement Color eyedropper. Then click again inside the frame to select a color value.

10. The final step is to color correct the image by adjusting the Spill Suppression slider. Pull the slider to color balance your subject. Your green screen key is complete. Thanks and happy green screening!