```
% Phase 1: Load the input image
input_image = imread('dog.jpg');
grayscale_image = rgb2gray(input_image);  % Convert to grayscale if the
image is RGB

% Phase 2: Create a binary mask for the region of interest (ROI)
% You can use roipoly to select the region manually or use thresholding
binary_mask = roipoly(grayscale_image);  % Manually select the region of
interest (ROI)
```

```
% Alternatively, use a threshold-based method to create a binary mask
% binary_mask = grayscale_image > 100;  % Adjust the threshold based on
your image properties

% Phase 3: Apply the mask to the grayscale image
roi_image = grayscale_image .* uint8(binary_mask);  % Masked image using
the binary mask
figure, imshow(roi_image), title('Masked Region of Interest');  % Display
the masked region
```

Masked Region of Interest

```
% Phase 4a: Apply Low-Pass Filter (Gaussian)
gaussian_smoothed_image = imgaussfilt(roi_image, 2);  % Gaussian filter
with sigma = 2
figure, imshow(gaussian_smoothed_image), title('Gaussian Smoothed Image');
% Display Gaussian filtered image
```

Gaussian Smoothed Image

```
% Phase 4b: Apply Low-Pass Filter (Average)
average_filter = fspecial('average', [5 5]);  % Create a 5x5 averaging
filter
average_smoothed_image = imfilter(roi_image, average_filter);  % Apply
average filter
figure, imshow(average_smoothed_image), title('Average Filtered Image');  %
Display average filtered image
```


```
% Phase 5a: Apply High-Pass Filter (Laplacian)
laplacian_filter = fspecial('laplacian', 0.2);  % Laplacian filter with
alpha = 0.2
laplacian_filtered_image = imfilter(roi_image, laplacian_filter);  % Apply
Laplacian filter
figure, imshow(laplacian_filtered_image), title('Laplacian Filtered
Image');  % Display Laplacian filtered image
```


```
% Phase 5b: Apply High-Pass Filter (Prewitt)
prewitt_filter = fspecial('prewitt');  % Prewitt filter for edge detection
prewitt_filtered_image = imfilter(roi_image, prewitt_filter);  % Apply
Prewitt filter
figure, imshow(prewitt_filtered_image), title('Prewitt Filtered Image');  %
Display Prewitt filtered image
```

Prewitt Filtered Image