

**VV033**  
**PHOTOGRAPHY**  
**FUNDAMENTALS**  
**(Light and Surfaces)**

**Session 5**  
**LENSES + OPTICS PRIMER**

**Mgr. et MgA. Veronika Lukášová, Ph.D.**

## → LENS BASICS

### FOCAL LENGTH

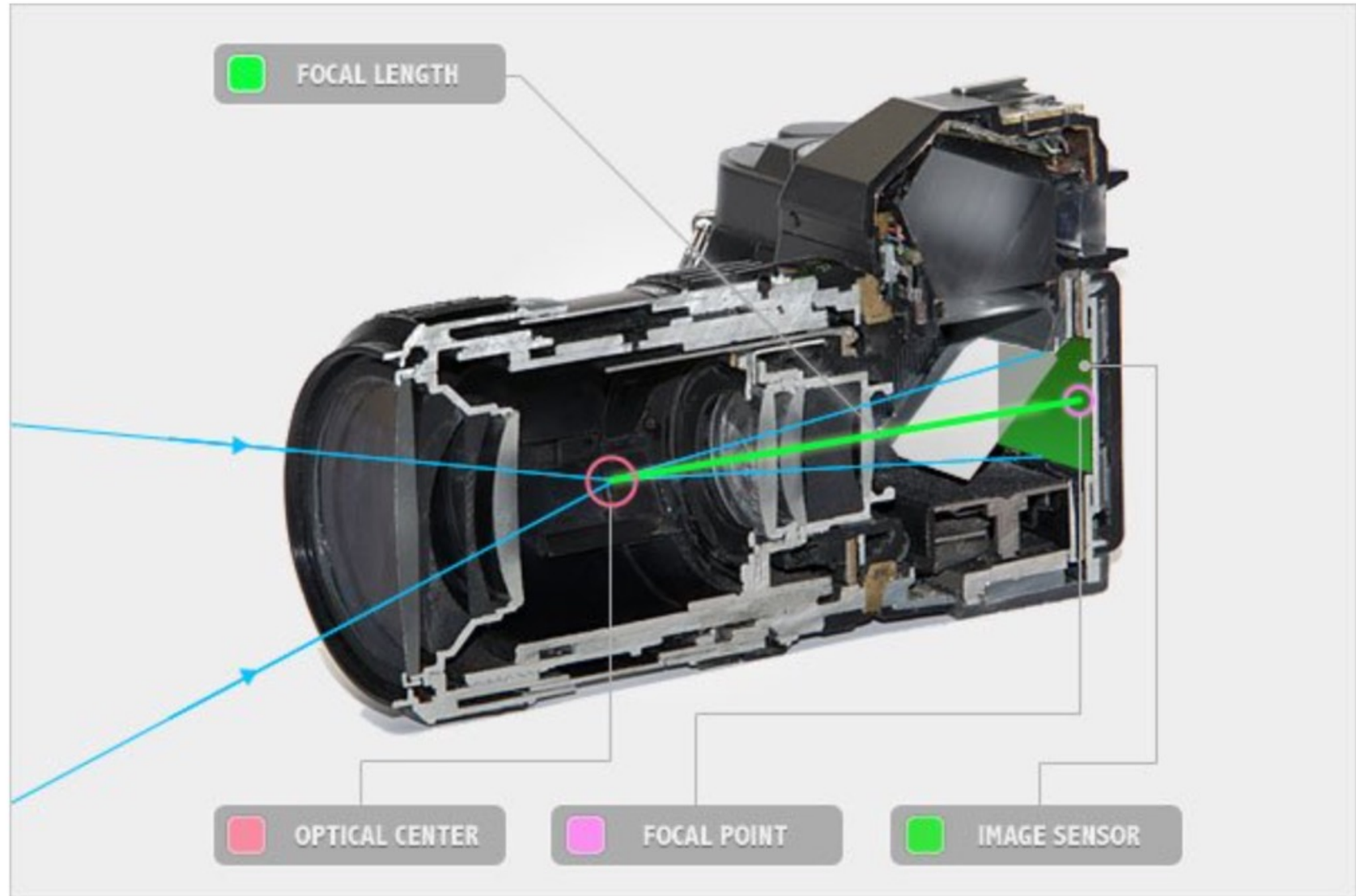
A lens' focal length is defined as the distance between the lens' optical center and the camera's image sensor (or film plane) when focused at infinity.

A lens' optical center is the point within a lens, at which the rays of light from two different sources entering the lens are assumed to cross.

Shorter focal length lenses provide a wider field of view.

Conversely, longer focal lengths provide a shorter field of view.

On DSLRs, the interchangeable lens' focal length is measured in millimeters.



## → LENS BASICS

- Front end of lens barrel, has ratio number (1:2.8, 1:2.8-4, 1:3.5-5.6, etc) indicating the maximum aperture of the lens.

- The aperture determines how much light the lens transmits to the image sensor.

- The lower the maximum aperture value will indicate the quality of the lens in terms of brightness. High quality zoom lenses deliver a constant f-stop throughout the focal range (i.e. a f/2.8 at 35mm and a f/2.8 at 80mm); whereas on a lower quality lens, the f-stop varies as you travel up the focal range (i.e. a f/3.5 at 28mm, but a f/5.6 at 80mm); you are losing at least one stop of light as you zoom up the focal length from wide angle to telephoto.



# **WHAT LENSES ARE THERE?**

**Fixed lenses**

**Zoom lenses**

**Macro lenses**

**Special lenses**

## → **FIXED LENS**

The standard lens has a fixed focal length (50mm, 85mm, 100mm), and reproduces fairly accurately what the human eye sees – in terms of perspective and angle of view.

For a 35mm film camera or a full-frame DSLR, the 50mm lens is considered standard.

At higher focal lengths (85mm or 100mm) you have an ideal lens for portraiture because when coupled with a wide aperture they thoroughly soften any background detail, thus making it less likely to distract from the main subject.





→ **FIXED LENS**

**50mm**

**Exposure Time:** 1/160  
**F Number:** 2.8  
**Exposure Program:** Manual  
**ISO:** 1250  
**Exif Version:** 0221  
**Date/Time Original:** 2012-02-25 19:44:51 EST  
**Create Date:** 2012-02-25 19:44:51 EST  
**Shutter Speed Value:** 1/160  
**Aperture Value:** 2.8  
**Exposure Compensation:** 0  
**Max Aperture Value:** 1.4  
**Metering Mode:** Multi-segment  
**Flash:** Off, Did not fire  
**Focal Length:** 50.0 mm



Photo by Veronika Lukasova

## → **WIDE ANGLE LENS**

A wide-angle has a shorter focal length (10 thru 42mm) when compared to a standard lens.

This enables you to capture a comparatively wider angle of view. A wide-angle lens is a natural choice for capturing outdoor landscapes and group portraits.

Wide-angle lenses capture a deep DOF





## → FIXED WIDE LENS

### 28mm / Capturing wide scene

Exposure Time: 1/4  
F Number: 8  
Exposure Program: Manual  
ISO: 320  
Exif Version: 0221  
Date/Time Original: 2012-02-25 16:52:16 EST  
Create Date: 2012-02-25 16:52:16 EST  
Shutter Speed Value: 1/4  
Aperture Value: 8  
Exposure Compensation: 0  
Max Aperture Value: 1.8  
Metering Mode: Multi-segment  
Flash: Off, Did not fire  
Focal Length: 28.0 mm



Photo by Veronika Lukasova



## → FIXED WIDE LENS

### 28mm / Capturing scene up close

**Exposure Time:** 1/160  
**F Number:** 3.5  
**Exposure Program:** Manual  
**ISO:** 1000  
**Exif Version:** 0221  
**Date/Time Original:** 2012-02-25 18:47:48 EST  
**Create Date:** 2012-02-25 18:47:48 EST  
**Shutter Speed Value:** 1/160  
**Aperture Value:** 3.5  
**Exposure Compensation:** 0  
**Max Aperture Value:** 1.8  
**Metering Mode:** Multi-segment  
**Flash:** Off, Did not fire  
**Focal Length:** 28.0 mm



Photo by Veronika Lukasova



## → ZOOM WIDE LENS

### 16mm

**Exposure Time:** 1/1000  
**F Number:** 4.5  
**Exposure Program:** Manual  
**ISO:** 100  
**Exif Version:** 0221  
**Date/Time Original:** 2009-01-20 11:16:06 EST  
**Create Date:** 2009-01-20 11:16:06 EST  
**Components Configuration:** Y, Cb, Cr, -  
**Shutter Speed Value:** 1/1024  
**Aperture Value:** 4.6  
**Exposure Compensation:** 0  
**Metering Mode:** Multi-segment  
**Flash:** Off, Did not fire  
**Focal Length:** 16.0 mm



Photo by Veronika Lukasova

## → TELEPHOTO LENS

Telephoto lenses (100mm – 800mm) provide a narrow field of view.

These long lenses enable you to compress a distance (and compress the sense of depth, as well) and pick out specific objects from far off.

They have a strong resolving power and an inherent shallow DOF, where the slightest lateral moment can take a subject out of view.

Telephoto lenses are great for wildlife, portrait, sports, and documentary types of photography.





## → TELEPHOTO LENS

# 85mm

**Exposure Time:** 1/100  
**F Number:** 2.2  
**Exposure Program:** Manual  
**ISO:** 1250  
**Exif Version:** 0221  
**Date/Time Original:** 2012-02-25 18:38:15 EST  
**Create Date:** 2012-02-25 18:38:15 EST  
**Shutter Speed Value:** 1/100  
**Aperture Value:** 2.2  
**Exposure Compensation:** 0  
**Max Aperture Value:** 1.8  
**Subject Distance:** 1.24 m  
**Metering Mode:** Multi-segment  
**Flash:** Off, Did not fire  
**Focal Length:** 85.0 mm



Photo by Veronika Lukasova

→ **DIFFERENT  
LOOKING  
PORTRAITS**



**WIDE LENS**



**TELEPHOTO LENS**



## → FISH EYE LENS

Wide-angle lens that provides extremely wide images by changing straight lines into curves.

It can sometimes produce circular, convex, or oval images by distorting the perspective and creating a 180° image.

The range of focal length varies between 7~16mm in a fish-eye lens.





→ **FISH EYE LENS**



<https://www.pinterest.com/pin/440015826079928802/>

## → **MACRO LENS**

Macro lenses are used for close-up or “macro” photography.

They range in focal lengths of between 50-200mm.

These lenses obtain razor-sharp focus for subjects within the macro focus distance, but lose their ability for sharp focus at other distances.



## → **MACRO EXTENSION RINGS**



→ **MACRO LENS**  
**50mm lens with**  
**macro rings**

**Exposure Time:** 1/200  
**F Number:** 9  
**Exposure Program:** Manual  
**ISO:** 100  
**Exif Version:** 0221  
**Date/Time Original:** 2020-04-06 17:20:45 EDT  
**Create Date:** 2020-04-06 17:20:45 EDT  
**Shutter Speed Value:** 1/200  
**Aperture Value:** 9  
**Exposure Compensation:** 0  
**Max Aperture Value:** 1.8  
**Metering Mode:** Multi-segment  
**Flash:** On, Fired  
**Focal Length:** 50.0 mm



Photo by Veronika Lukasova



→ **MACRO LENS**



Image Credit: [Macro](#) by A Guy Taking Pictures

## → **SPECIALIZED LENSES: TILT SHIFT LENS**

### TILT SHIFT LENS

Tilt shift lenses have been favored by architectural photographers for decades. They aim to reduce distortion and achieve straight and even lines for their images. Tilt shifts have made their way into popular photography styles by providing interesting depth of field options, which used as a particular style in modern photography.



→ **SPECIALIZED  
LENSES: TILT  
SHIFT LENS**



Image credit: [Tilt Shift](#) by pinboke\_planet



## → **SPECIALIZED LENSES: AMAZING BOKEH**

There are many lenses that set themselves apart by producing interesting bokeh. Lenses such as the Helios 44 are known to create a spiraling effect (often called swirl bokeh) in images because of the overcompensation of reducing barrel distortion within the lenses glass elements.

While other lenses, such as Petzval lenses, create incredible smooth and "milky" bokeh. Often, these effects are highly desired and help create an interesting signature to your images.



Image Credit: [Swirl Bokeh](#) by Piotr P

## → **SPECIALIZED LENSES: LENS ADAPTOR**

Lens adaptor allows you to fit a lens on your camera that was originally not made for being used together.

Keep in my that the adaptor **WILL CHANGE THE FOCAL LENGTH OF THE USED LENS!**

E-snop

Doprava zdarma



★★★★★ 1x

**B.I.G. adaptér obj.  
Pentacon Six na tělo  
Canon EF**

- výrobce: Fotodiox
- typ produktu: adaptér
- uchycení objektivu: Pentaco SIX (bajonet)



## → SPECIALIZED LENSES: LENS ADAPTOR



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|                                  |                               |
|----------------------------------|-------------------------------|
| <b>Make:</b>                     | Canon                         |
| <b>Camera Model Name:</b>        | Canon EOS 5D Mark II          |
| <b>Orientation:</b>              | Rotate 270 CW                 |
| <b>X Resolution:</b>             | 72                            |
| <b>Y Resolution:</b>             | 72                            |
| <b>Resolution Unit:</b>          | inches                        |
| <b>Modify Date:</b>              | 2021-05-18 06:47:49 EDT       |
| <b>White Point:</b>              | 0.313 0.329                   |
| <b>Primary Chromaticities:</b>   | 0.64 0.33 0.21 0.71 0.15 0.06 |
| <b>Y Cb Cr Coefficients:</b>     | 0.299 0.587 0.114             |
| <b>Y Cb Cr Positioning:</b>      | Co-sited                      |
| <b>Exposure Time:</b>            | 1/160                         |
| <b>F Number:</b>                 | 0                             |
| <b>Exposure Program:</b>         | Manual                        |
| <b>ISO:</b>                      | 100                           |
| <b>Exif Version:</b>             | 0221                          |
| <b>Date/Time Original:</b>       | 2021-05-18 06:47:49 EDT       |
| <b>Create Date:</b>              | 2021-05-18 06:47:49 EDT       |
| <b>Components Configuration:</b> | Y, Cb, Cr, -                  |



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**ASSIGNMENT 1**  
**Work in the Studio in groups**

→ **FOCAL LENGTH**

Create a portrait of a same person with three different focal lengths

Wide lens (16-28mm) / Fixed lens (35mm, 50mm)  
Telephoto lens (85mm and up)

Submit 3 jpgs

FOLDER: FOCAL LENGTH



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**ASSIGNMENT 2**  
**Work around FIMU**

→ **TELEPHOTO SPY**  
**Work individually or in groups**  
**to share a long lens**

Photograph people through a lit  
windows of the FIMU or other details  
you find interesting with long lens.



FOLDER: TELEPHOTO



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**ASSIGNMENT 3**  
**Studio 2 in groups**

→ **MACRO PHOTOGRAPHY**  
**use tripod to compensate for the long exposure time to avoid using a very high ISO**

Choose an object and photograph it with 3 different apertures. Start with a very soft detail = an aperture around 2.8-3.5 then move to aperture around F8 and lastly try as sharp aperture as your lens allows F11 and higher. The closer you are to the object, the less DOF you get so in this assignment you are testing how to retain sharpness in macrophotography.

Submit 3 jpgs

FOLDER: MACROPHOTOGRAPHY





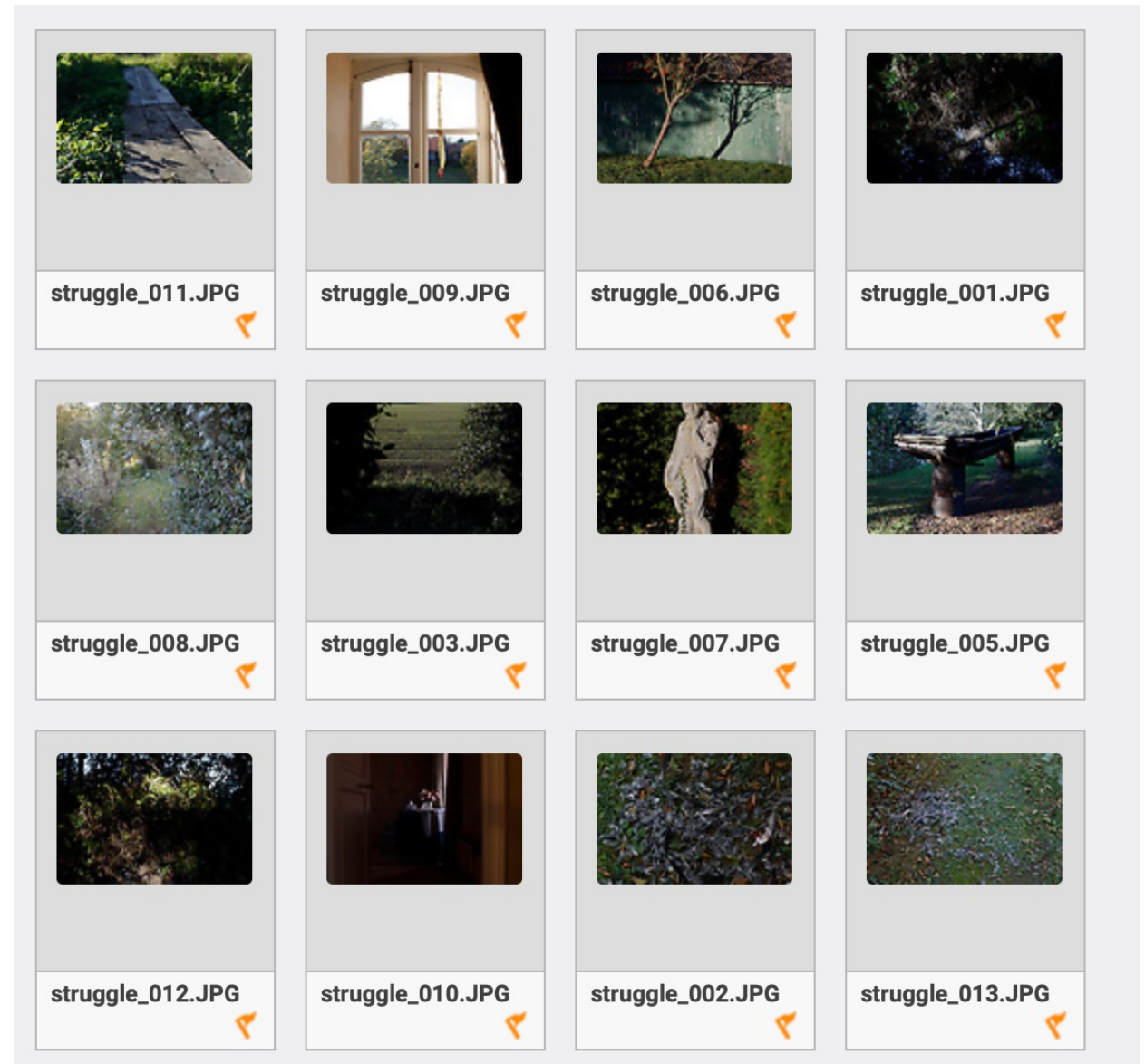
# VV033 PHOTOGRAPHY Light and Surfaces Session 5

## ASSIGNMENT 4 10 ENVIRONMENTAL PHOTOS series with FIXED LENS Work around FIMU

### → The FIXED LENS 50mm

Choose a location at FIMU – room, landing, foyer, courtyard...and create a series of photos with the same lens that convey the environment and details of the environment. Because you will be using uniform lens, you will discover that the series feels coherent. If you cant work with a fixed lens, set your zoom lens to 50mm and only shoot with 50mm.

FOLDER: FIXED LENS ENVIRONMENTAL SERIES



# **A GUIDE FOR CREATIVE CRITICISM**

**Be fully present  
Participate  
Ask Questions  
Listen**

**Agree to Disagree  
Allow for Emotions  
Be Specific  
Be Open-Minded  
Be Honest**

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**VV033 2023**

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