

## Tali Treibitz: Principles in Underwater Imaging and Computer Vision Course Syllabus

1. Basic concepts in photography: cameras, types of sensors, lenses, noise, considerations in choosing a camera
2. Basic concepts in color: color vision, color spaces, and basic concepts in lighting: calculation of efficiency and intensity of illumination
3. Image processing pipeline
4. Geometric image formation model
5. Practical class: calibration of radiometric response, color, noise and geometry of cameras
6. Light propagation in the medium: absorption, scattering and refraction
7. Underwater imaging systems and underwater imaging systems (one camera and multiple cameras).
8. Basic methods of underwater image processing: adjusting of light, color, nonuniform illumination
9. Practical class: planning photography in water, making and improving pictures
10. Stereo reconstruction
11. 3D reconstruction
12. Segmentation: intro
13. Automatic identification: intro
14. Multispectral, fluorescence, microscopes

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1. Basic concepts in photography: cameras, types of sensors, lenses, noise, considerations in choosing a camera
2. Color
3. Geometry and 3D reconstruction
4. Noise & image processing pipeline
5. Photometry
6. Ocean optics
7. Image formation models
8. Underwater Image Reconstruction
9. Single image reconstruction and a revised underwater image formation model
10. Geometry of flat ports and dome ports
11. Multispectral and fluorescence imaging
12. Underwater microcopy
13. Underwater imaging systems and applications

### Evaluation:

3 HW assignments (theoretical and practical), each one 20%

Final exam 40%