

Mathematical Methods for Image Synthesis - Reading/Project 1

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In this class you will need to do one project and one article reading that will be presented at the end of the semester. If you take a project with me, you will need to take a reading from Julie's part, and conversely, if you take the reading with me, you'll need to take a project from Julie. A project is expected to take between 15 and 30 hours, and can be implemented with any **imperative** programming language you want. Readings go much more in-depth than the class lectures, and are thus more complex.

1 Readings – weeks 1-2

You can choose between these 3 options :

- Implicit Visibility and Antiradiance for Interactive Global Illumination, Dachsbacher et al. 2007 <https://www-sop.inria.fr/reves/Basilic/2007/DSDD07/ImplicitVisibilityAndAntiradiance.pdf>
- Manifold Exploration : A Markov Chain Monte Carlo Technique for Rendering Scenes with Difficult Specular Transport, Jakob and Marschner, 2012 <http://www.cs.cornell.edu/projects/manifolds-sg12/manifolds-sg12.pdf>
- A Frequency analysis of Light Transport, Durand et al. 2005 <https://people.csail.mit.edu/fredo/PUBLI/Fourier/>

2 Project

For this project, we require you to implement a simple path tracer, dealing with spheres and a static camera. The following lectures notes will take you to the implementation of such a path tracer. For this project, we will

implement a path tracer with diffuse, pure specular and pure transparent materials, using only point lights, handling shadows, indirect lighting and gamma correction. This corresponds to all parts described before the “optional part”, and took 3 classes of 4 hours to implement (with some supervision) for Centrale students :)

- French version : <https://goo.gl/hWNL6l>
- English version : <https://goo.gl/3a9X7z> This is currently a very poor google translation of the french version, but I will improve the translation over the next few weeks.

While we allow for any imperative language, the runtime cost can be expensive, and using slow languages (i.e., matlab or python) is not recommended. You will not be penalized if you choose these languages, but this can make debugging harder for you (especially when launching multiple rays per pixel).