Physically Based Rendering and Material Appearance Modelling

Timetable

This module runs as a 3-weeks course in June. The 2021 version runs as an online course on Zoom.

Calendar:	**4 June** to **24 June**	(starts on a Friday)
Location:	**Zoom**	(link to be announced on DTU Inside)
Daily schedule:	**workdays 9–12**	(lecture followed by exercises)

Afternoons (except the last day) are set off for studying and doing independent work on exercises. One or two mornings may also be left open for doing independent work.

The **last day** is set off for preparation and **presentation of a slide** that presents the work in your lab journal. The slide is to be prepared in the morning and presented in the afternoon.

Lab journal and presentation slide hand-in deadline: **23:59 Thursday 24 June 2021**.

Textbook and Notes

The main text book for the course is

P Pharr, M., Jakob, W., and Humphreys, G. *Physically Based Rendering: From Theory to Implementation*, third edition, Morgan Kaufmann/Elsevier, 2017. https://pbrt.org/

Free HTML version: https://pbr-book.org/

DTU Findit access:
http://www.sciencedirect.com.proxy.findit.dtu.dk/science/book/9780128006450

In addition, we will upload papers to DTU Inside that serve sometimes as supplementary reading material sometimes as part of the curriculum.

Prerequisites and Programming Resources

See separate documents uploaded to DTU Inside File Sharing (`prerequisites.pdf` and `pbrt.pdf`).

Assessment

Throughout the course you are expected to maintain a lab journal that presents the deliverables of the worksheets. At the last day, you are expected to prepare a slide with results from your lab journal in the morning and present it in the afternoon. The lab journal and the presentation slide are to be handed in at the final hand-in deadline (see above). Your work is assessed in its entirety, and you will receive a pass or not pass grade.

JERF 2021

Preliminary Schedule

Week	Subject	Curriculum	Exercises
1 4/6	Introduction, basic radiometry, Lambertian reflection, light sources.	**P**: Sections 1–1.2, 1.7 (21 pages) **P**: Sections 5.4–5.6 (18 pages) **P**: Sections 8–8.3 except 8.2 (11 pages) **P**: 12–12.1 + 12.3 except 12.3.1–12.3.3 and Sections 12.4–12.5 (18 pages)	*Worksheet 1*
2 7/6	Light and colour, sun and sky, high dynamic range.	Book excerpt [Reinhard et al. 2010] (69 pages) Paper [Preetham et al. 1999] (10 pages) (**P**: Sections 5–5.3, 21 optional pages)	*Worksheet 2*
3 8/6	Wave theory of light, reflection and transmission, Russian roulette.	Book excerpt [Frisvad 2008] (17 pages) **P**: Section 8.2 (17 pages) **P**: Section 13.7 (3 pages)	*Worksheet 3*
4 9/6	Monte Carlo integration, soft shadows, direct lighting, ambient occlusion.	**P**: Sections 13–13.3, 13.5–13.6.5 (28 pages) **P**: Section 14.2–14.2.3 (11 pages) **P**: Section 14.3 (11 pages)	*Worksheet 4*
5 10/6	Path tracing.	**P**: Sections 14.4–14.5 (19 pages)	*Worksheet 5*
6 11/6	Microfacet models, importance sampling.	**P**: Sections 8.4–8.5 (19 pages) **P**: Sections 13.10, 14–14.1.3 (19 pages)	*Worksheet 6*
7 14/6	Radiative transfer, volume rendering.	**P**: Sections 11–11.3 (21 pages) **P**: Sections 15–15.3 (17 pages)	*Worksheet 7*
8 15/6	Scattering by particles, material appearance.	Paper [Frisvad et al. 2007] (10 pages) Paper [Dal Corso et al. 2016] (4 pages)	*Worksheet 8*
9 16/6	BSSRDF, subsurface scattering, diffusion.	**P**: Section 11.4 (11 pages) **P**: Section 15.4 (14 pages) **P**: Section 15.5 (24 pages)	*Worksheet 9*
10 17/6	Directional subsurface scattering.	Optional paper [Frisvad et al. 2014a] (12 pages)	Mini project.
11 18/6	Particle tracing, photon mapping.	**P**: Section 16–16.2 (44 pages)	Mini project.
12 21/6	Density estimation, photon differentials.	Thesis excerpt [Schjøth 2009] (18 pages) Paper [Frisvad et al. 2014b] (12 pages)	Mini project.
13 22/6	Dispersion, spectral rendering.	Paper [Sun et al. 2000] (6 pages)	Mini project.
14 23/6	Camera and eye: depth of field, glare.	**P**: Sections 6–6.2 (21 pages) **P**: Section 13.6.6 (1 page) Paper [Ritschel et al. 2009] (10 pages)	Mini project.
15 24/6			Slide preparation, slide presentation.