Advanced Rendering
(formerly: Computer Graphics II)

Summer Term (SS) 2012
Prof. Dr. Gitta Domik
Dipl.-Inform. Stephan Arens
People

• Lecture:
  • Prof. Dr. Gitta Domik (F2.204)
  • Dipl.Inform. Stephan Arens (F2.209)

• Lab:
  • Dipl.Inform. Stephan Arens
  • N.N.

• Secretary:
  • Lydia Kreiss (mornings) (F2.207)
Lectures / Assignments

Lectures
• We 9:15 am F1.110
• Fr 9:15 am F1.110
• First day of lectures 04/04/2012
• Last day of lectures 05/25/2012
• Lab starts THIS week

Lab
• Friday, right after lecture, first in F1.110, then in F2.520
• Questions? Monday, 15:00 to 17:00, F2.209/F2.204
Master Module III.4.1


Advanced Rendering
+
Data and Information Visualization
Goals of Course

• Make computer graphics more exciting
• Add textures, shaders, bump maps, non-photorealistic rendering, image based effects, etc., to pipeline rendering
• Learn abilities useful for game programming
• Develop a theoretical understanding of alternate rendering algorithms (e.g. raytracing, radiosity)
Contents of Course

- Pipeline and GPU programming
- Scene Graph
- Advanced illumination and reflection
- Texture, Environmental and Bump Mapping, Blending
- Image-based Rendering
- Non-photorealistic Rendering
- Advanced modelling (e.g. of curves)
- Raytracing
- Radiosity
- Guest lectures:
  - Professor Beatriz Sousa Santos, U of Aveiro, Portugal
  - Dr. Berssenbrügge, Dr. Radkowski, Dr. Fischer, UPB
Labs and Prerequisites

• Programming Assignments using OpenGL / JAVA
• You should be a moderate programmer of Java and OpenGL
• You should know the basics of computer graphics algorithms.
• „OpenGL – A Primer“ by Ed Angel is a good way to catch up.
• To finish module „Graphics and Visual Computing“ (III. 4.1), you will need the course Information and Data Visualization or a seminar.
• You need to sign up for course in PAUL and koaLA!!
Get a Grade …

• Every assignment needs to be done (Malus system … counting for *up to 2 grades*)
• There are four assignment sheets
• Extra bonus is possible for adding „user studies“ to exam topics
• Bonus counts *exactly one subgrade* (e.g. 1.7 to 1.3; or 2.0 to 1.7)
• Instead of a final test there will be a final project
• Grade = Grade of project (minus malus plus bonus)
• Grade of project has to be positive to pass course
Project „Campus“

- Gameslab provides basic model. **You will provide eye candy!**
  (winter scene, underwater scene, miniature toys scene...)

Advanced Rendering – SS 2012
Project details

- 3 students per group (if necessary, exceptions possible)
- Basic project: **Campus Scene**
- Must use modeling, animation, shader(s)
- Add additional effects
  - *Either one or more of: photorealistic rendering (e.g. image based rendering) or non-photorealistic rendering effects*
- Presentation of the project proposals in lecture May 4
  - *At least: Set up a scene graph with dummies for all your final objects – Better: Show first results*
  - *Create a short 3 slide presentation of your goals and techniques*
- Submit your project: May 25  *(installation on presentation PC)*
- Present your project: May 30 / June 1
- More information in lectures/ lab or through koaLA and *grafik@upb.de*
Grading of Project

- Project will be graded:
  - 50% oral presentation (everyone presents, what he has done within the project)
  - 50% your delivered product
Bonus: user studies

- Participate in a user study
  - understand the strategy of **controlled** experiments
  - 20-45 min to evaluate a visualization or a game
  - will take place end of April
  - you can subscribe in a list (details shortly)
  - bonus: one subgrade
Module Exams

Three grades will be averaged:
- Advanced Rendering (project grade – malus + bonus)
- Visualization (project grade – malus + bonus) or seminar
- Oral exam

For the oral exam:
- Bring pictures of project (one A4 page) for each final project.
- You will be asked to present each project in less than 5 min.
- You will answer questions about your algorithms used in the project AND questions from a list of topics.

If seminar is part of module, it will only be a prerequisite, no questions on the seminar will be asked.
## Module Exams (cont.)

<table>
<thead>
<tr>
<th>Topics in Adv. Rendering</th>
<th>Topics in Visualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texture, Environment, Bump Mapping</td>
<td>The Data</td>
</tr>
<tr>
<td>GPU Rendering Pipeline</td>
<td>The User and the Task</td>
</tr>
<tr>
<td>Advanced Shading</td>
<td>Mapping Techniques in Visualization</td>
</tr>
<tr>
<td>Image Based Effects</td>
<td>Presentation Techniques</td>
</tr>
<tr>
<td>Non Photorealistic Rendering</td>
<td>Volume Visualization</td>
</tr>
<tr>
<td>Bezier and B-Splines</td>
<td>Flow Visualization</td>
</tr>
<tr>
<td>Raytracing</td>
<td>Interaction in Visualization</td>
</tr>
<tr>
<td>Radiosity</td>
<td>(evaluation by controlled experiments)</td>
</tr>
<tr>
<td>(evaluation by controlled experiments)</td>
<td></td>
</tr>
<tr>
<td><em>Use lecture notes and text books to prepare</em></td>
<td><em>Use lecture notes, on-line tutorial and text books to prepare</em></td>
</tr>
</tbody>
</table>
Recommended Books

• T. Akenine-Möller, E. Haines and N. Hoffman
  Real-Time Rendering, Third Edition
• Edward Angel    Interactive Computer Graphics, 5th
  Edition, 2008. – discount -
• D. Shreiner et al. OpenGL Programming Guide. Fifth
  Edition (Red Book) – discount -