UCL Université catholique de Louvain

LINGI2325

2010-2011

Graphic systems and applications

5.0 credits	30.0 h + 15.0 h	2q

Teacher(s) :	Dutré Philip ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	> http://www.icampus.ucl.ac.be/claroline/course/index.php?cid=INGI2325_001
Prerequisites :	The programming assignment for this course (which is rather elaborate) requires good programming skills and the use of the UNIX operating system.
Main themes :	-- Hardware for graphics systems. -- Fundamental concepts of computer graphics software. -- Data structures used in graphics applications. -- Study of specialized algorithms: line drawing, polygon filling, transformations, clipping, perspective projection, visible-surface determination, ray tracing, radiosity. -- Study and use of standard software packages for graphics applications. -- Modelling surfaces and threedimensional objects.
Aims :	-- Master the fundamental concepts in the field of Computer Graphics, in particular the high-level notions which allow to minimize the impact of hardware characteristics and facilitate the construction of well-structured programs. -- Know the principles underlying the main algorithms for object visualisation: line drawing, raster conversion, clipping, transformations, projections (perspective), shading, hidden-surface elimination. -- Understand the structure of software packages for graphics applications. - Learn to construct software for graphics applications. -- Know the most important techniques for modelling threedimensional objects. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Teaching methods :	-- Lectures -- Two programming assignments allow the students to become acquainted with the implementation details of some of the algorithms presented in the course (3-D transformations and perspective, hidden surface elimination, ray tracing, ...)
Content :	-- Fundamental algorithms for the visualisation of 2-D primitives on raster hardware: lines, circles, polygons, clipping, filling. -- Geometrical transformations (2-D and 3-D), projections. -- Representations of curves and surfaces: polygonal meshes, parametric cubic curves, parametric bicubic surfaces, fractal models, grammar-based models. -- Solid modelling using boolean operations, sweeping, spatial partitioning. -- Human perception of light and color. -- Visible-surface determination algorithms: z-buffer, scan-line algorithms, ray casting, priority lists, image subdivision. -- Shading models and shadow casting, ray tracing, transparency, radiosity, global illumination.
Bibliography :	-- F. S. Hill, "Computer Graphics using Open GL (2nd ed.)", Prentice-Hall, 2001, 0-13-320326-3. -- Foley, van Dam, Feiner, Hughes, "Computer Graphics: principles and practice (2nd ed.)", Addison-Wesley, 1990, 0-201-12110-7. -- Foley, van Dam, Feiner, Hughes, Phillips, "Introduction à l'Infographie (éd. française)", Addison-Wesley, 1995, 2-87908-058-4. -- Burger, Gillies, "Interactive Computer Graphics: functional, procedural and device-level methods", Addison-Wesley, 1990, 0-201-17439-1. -- Alan Watt, "Fundamentals of Three-dimensional Computer Graphics", Addison-Wesley, 1990, 0-201-15442-0. -- Hearn, Baker, "Computer Graphics (2nd ed.), Prentice-Hall, 1994, 0-13-159690-X.
Cycle and year of study :	> Master [120] in Computer Science > Master [120] in Computer Science and Engineering
Faculty or entity in charge:	INFO