# What is Computer Graphics?



Source: http://wall.alphacoders.com

# What is Computer Graphics (CG)?

- Science and art of visual communication via the computer
- CG is highly cross disciplinary:

CG = Physics + Mathematics + Human perception + HCI + Engineering + Art

## Graphics Areas



### CG in Entertainment

#### Video games











### CG in Entertainment

#### Film special effects (VFX)





VFX Video

Virtual Backlot

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# CG in CAD/CAM



Source: <u>http://autocad-architecture-blog.com/how-to/how-to-start-project/</u>



Source: http://www.3shapedental.com/pressreleases/3shape-launches-implant-studio/



Source: http://renderingofarchitecture.com/3d-visualisation-urban-planning-almeria

Source: http://medspark.ms/Technical-Glossary-All.php

CAD/CAM: Computer Aided Design/ Computer Aided Manufacturing

### CG in Simulation









Source: <u>http://physbam.stanford.edu/~fedkiw/</u>





Source: http://http.developer.nvidia.com/GPUGems3/gpugems3\_ch30.html

### CG in Medical Imaging



# What is required in Graphics?

- Core concepts from Mathematics (calculus, geometry, algebra, differential equations, numerical methods )

- Core concepts from Physics (basic laws, optics, electromagnetism)

- Core concepts from Computer Science (Data structures, algorithms) and lots of programming!

# What to learn in Graphics?

# Graphics APIs



### 2D/3D Transformations











# Lighting and Shading









## Texturing













### Curves and Surfaces



# Ray Tracing





# Photorealistic Rendering



### and much more...

