

# GA 3220 - GAME SHADER DEVELOPMENT

Credits: 3

In this junior-level course students will use 2D and 3D painting, as well as photo-editing techniques to expand their personal texture library and build complex shader systems utilizing a game engine. This studio-based course will explore advanced shader systems including those for animated, intelligent, reactive, and scripted materials. Upon successful completion of this course, students will have produced a fully textured environment utilizing a variety of animated and/or intelligent shader systems.

Prerequisites: AN3D 2320 - 3D Computer Lighting + Materials and GA 2220 - Game Creation Fundamentals

Notes: (Formerly GA 3220)

Course Learning Outcomes:	Exceeding	Meeting	Developing	Not meeting	Program Outcomes	New Institutional Outcomes
Create custom material networks utilizing native software tools.	Node-based texture networks are comprised of fundamental maps (diffuse, specular, bump), incorporate mathematics functions, and are modified by procedural elements to create an accurate representation of the chosen surface. Shaders are fully parameterized for optimization.	Node-based texture networks are comprised of fundamental maps (diffuse, specular, bump) in addition to at least three mathematics functions, and come close to emulating the chosen surface	Node-based texture networks rely solely on fundamental maps, and do not utilize mathematics functions. Material may only vaguely resemble chosen surface	Node-based texture networks are entirely procedural (math-based), or are missing essential maps for surface emulation. Material does not represent chosen surface	GA-1, GA-2, GA-3, GA-6	Design Competence, Critical Thinking
Observe real world objects and translate their surface properties into shader attributes.	Obvious influence of reference material. Develops materials by painting, photo-manipulating, or sculpting textures which accurately emulate real-world surface properties by incorporating the following: <ul style="list-style-type: none"> <li>□ diffuse,</li> <li>□ damage/grunge,</li> <li>□ metallic/roughness,</li> <li>□ normals</li> <li>□ opacity</li> <li>□ height/displacement</li> <li>□ vertex painting</li> </ul>	Some reference influence evident. Develops materials by painting, photo-manipulating, or sculpting textures which accurately emulate real-world surface properties by incorporating the following: <ul style="list-style-type: none"> <li>□ diffuse,</li> <li>□ metallic/roughness,</li> <li>□ normals</li> <li>□ opacity</li> </ul>	Little evidence of reference material present. Develops materials by painting, photo-manipulating, or sculpting textures which accurately emulate real-world surface properties by incorporating the following: <ul style="list-style-type: none"> <li>□ diffuse,</li> <li>□ metallic/roughness,</li> <li>□ opacity</li> </ul>	No evidence of reference. Does not sufficiently develop materials by painting, photo-manipulating, or sculpting textures which accurately emulate real-world surface properties, OR less than three of the following maps are present: <ul style="list-style-type: none"> <li>□ diffuse,</li> <li>□ damage/grunge,</li> <li>□ metallic/roughness,</li> <li>□ normals</li> <li>□ opacity</li> </ul>	GA-1, GA-2, GA-3, GA-6	Design Competence, Critical Thinking
Practice hand-painting textures, deriving them from photographs or procedurally generating them.	Textures derived from hand-painting or photographic means consistently emulate surface attributes, with minor flaws or variance.	Textures derived from hand-painting or photographic means consistently emulate surface attributes, with minor flaws or variance.	Textures derived from hand-painting or photographic means consistently emulate surface attributes, with minor flaws or variance.	Textures derived from hand-painting or photographic means consistently emulate surface attributes, with minor flaws or variance.	GA-1, GA-3, GA-6	Design Competence, Critical Thinking
Produce clean, functional light maps.	Light maps contain no overlapping or twisting, are laid out in 0 to 1 space, exhibit no distortion, are scaled for consistency and have adequate padding based on destination texture resolution	Light maps contain no overlapping or twisting, are laid out in 0 to 1 space, exhibit minimal distortion, are scaled for consistency and have adequate padding based on destination texture resolution	Light maps contains minimal overlapping or twisting, are laid out in 0 to 1 space, exhibit noticeable distortion, are not scaled for consistency and have irregular padding based on destination texture resolution	Light maps contain excessive overlapping or twisting, are laid out beyond 0 to 1 space, exhibit extreme distortion, are not scaled for consistency and do not have adequate padding based on destination texture resolution	GA-1, GA-6	Critical Thinking