

MTD203e Advanced Graphics Design

Level: 2

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JAN

E-Learning: BLENDED - Learning is done MAINLY online using interactive study materials in Canvas. Students receive guidance and support from online instructors via discussion forums and emails. This is supplemented with SOME face-to-face sessions. If the course has an exam component, this will be administered on-campus.

Synopsis:

*** Students are strongly encouraged to have taken MTH102 Matrices and Transformations before registering for this course.***

MTD203 Advanced Graphics Design introduces students the mathematics and optics for computer graphics. At the end of the course, students will possess basic knowledge in geometry and optics for computer graphics, so that they can describe the detailed mechanism of ray tracing. In this course, the basic geometry includes vectors, matrices, transformation, and line-object intersection. The basic optics includes lighting, reflection model, shading, and reflection/refraction vectors.

Topics:

- Vectors
- Matrices
- Basic transformations
- Composite transformations
- Lines and Planes
- Ray-Object Intersections
- Lighting
- Reflection model
- Shading
- Reflection vector
- Refraction vector
- Ray tracing

Textbooks:

Eric Lengyel: Mathematics For 3D Game Programming And Computer Graphics 3rd ed. Cengage
ISBN-13: 9781435458864

Eric Lengyel: Mathematics For 3D Game Programming And Computer Graphics 3rd ed. Cengage
ISBN-13: 9781435458864-AA

Learning Outcome:

- Discuss the operations and properties of vectors, including the geometrical meaning of the operations.
- Solve the operations and properties of matrices
- Demonstrate the transformation operations including scaling, translation, rotation, and composite transformation
- Calculate the intersection between a ray and an object
- Explain the 3D geometry of lines, planes
- Describe the surface intersections and normal vector calculation
- Explain the concepts of lighting, shading, and reflection
- Illustrate the concept of ray tracing
- Calculate vector and matrix arithmetic
- Solve the roots of quadratic polynomials
- Calculate the intersection between a ray and an object
- Compute pixel intensity based on Phong reflection model and shading techniques
- Solve reflection and refraction vectors

Assessment Strategies:

Continuous Assessment Component	Weightage (%)
TUTOR-MARKED ASSIGNMENT	15
QUIZ	9
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
PRE-CLASS QUIZ	2
Sub-Total	30

Examinable Component	Weightage (%)
Written Exam	70
Sub-Total	70

Weightage Total **100**