

University of Kansas Middle School Summer Camp 2019

Imagination to Creation

Computer Modeling & 3D Printing

June 24 – 25, 9am-5pm

Day 1- June 24, 2019

Introduction (09:00 am-09:15 am)

Session 1- CAD I (09:15 am -10:30 am)

UW-Madison Lecture (09:15 am -09:45 am): Describe CAD primitives, 2D geometries

KU GMSH CAD demo (09:45 am -10:00 am)

KU GMSH CAD Exercise (10:00 am -10:30 am): Basic geometries (rectangle, circle, ellipse, adding points and lines)

Session 2- CAD II (10:30 am-12:00 pm)

UW-Madison Lecture (10:30 am -11:00 am): Boolean, translation, rotation, extrusion

KU GMSH CAD demo (11:00 am -11:15 am)

KU GMSH CAD Exercise (11:15 am -12:00 pm)

Lunch Break (12:00 pm-12:30 pm)

Session 3 – Mesh I (12:30 pm -02:15 pm)

KU Lecture Dr. Shontz (12:30 pm – 01:00 pm): Concept of meshing, mesh primitives

KU GMSH meshing demo (01:00 pm – 01:30 pm)

KU GMSH meshing Exercise (01:30 pm-02:15 pm): Triangular mesh in 2D-How to create a mesh, different mesh generation process, smoothing, refine by splitting

Session 4 – Mesh II (02:15 pm – 03:30 pm)

KU lecture Dr. Shontz (02:15 pm – 02:45 pm): different element types, quad vs triangle, quality, high-order mesh

KU GMSH meshing demo (02:45 pm – 03:00 pm)

KU GMSH meshing Exercise (03:00 pm – 03:30 pm): Quad elements in 2D- How to create a mesh, different mesh generation process, smoothing, refine by splitting, comparison between quad and triangular mesh

Session 5 – Do it yourself (03:30 pm- 04:30 pm)

Students will work on the GMSH software to create geometries and meshes using the techniques discussed so far.

Day 2- June 25, 2019

Revising the previous day (09:00 am-09:15 am)

Session 1- CAD III (09:15 am -10:30 am)

UW-Madison Lecture (09:15 am -09:45 am): 3D geometries, 2D vs 3D geometry

KU GMSH CAD demo (09:45 am -10:00 am)

KU GMSH CAD Exercise (10:00 am -10:30 am): Creating 3D geometries

Session 2- Mesh III (10:30 am-12:00 pm)

KU Lecture Dr. Shontz (10:30 am -11:00 am): 3D mesh vs 2D mesh

KU GMSH 3D meshing demo (11:00 am -11:15 am)

KU GMSH 3D meshing Exercise (11:15 am -12:00 pm): 3D mesh, 3D vs 2D mesh elements, refining, different mesh generation technique, high-order meshing

Lunch Break (12:00 pm-12:30 pm)

Session 3 – Finite Element Analysis (12:30 pm - 02:30 pm)

UW-Madison Lecture (12:30 pm – 01:00 pm): FEM in terms of images and graphics. The basic idea of force and stress and FEM analysis images showing high-low stress.

KU and UW-Madison Hands-on object making (popsicle stick bridge) and understanding how force and stress might work for different designs. (01:00 pm -02:45 pm)

Session 4 – 3D printing (02:45 pm – 03:45 pm)

UW-Madison Lecture (02:45 pm-03:15pm)

KU - Demonstration of 3D printing (03:15 pm-4:15)

Closing (4:15 pm-5:00 pm)