THE UNIVERSITY OF RHODE ISLAND

EGR 106
Foundations of Engineering II

Lecture 9 – Part B
Exam 2 review / Design Project Introduction

This Week's Topics

Exam 2 Review

Design Project Introduction

Exam 2 Format

- Tuesday/Thursday instructors are responsible for Exam 2
- Hence, content & procedures may be different for each section
- You will be asked to write and debug short Matlab scripts for problems that are similar to weekly assignments
- Procedures for collecting your scripts will be provided by your instructor
- Exam guidelines
  - The exam format will be “open notes” and you may refer to the scripts you’ve written for the weekly assignments
  - Access to EGR 106 lecture materials on Brightspace IS ALLOWED
  - Use of any other resource or communication (cell phones, e-mail, etc.) is NOT allowed
  - You MAY NOT open any other windows other than Brightspace and Matlab

Topics to Review

Basic operations

- Addition, subtraction, multiplication, division, powers ('^'), sqrt
- Order of operations (PEMDAS)
- Trigonometric functions (sine, cosine, etc.)
- Exponential function, logarithm (e^x, log, log10)

Arrays and array mathematics

- Matrix operations (size, linspace, 'colon' operator)
- Element by element operations
- Array (matrix) multiplication
- Solving systems of equations (array division)
- Vector operations

Topics to Review (cont.)

Writing Scripts

- Input and Output Commands (input, disp, num2str)
- Scripting commands (clc, clear, close, pause, %, format, etc.)

2D Plotting

- plot command, line specifiers and properties
- multiple graphs
- formatting a plot
- logarithmic axes
- special graphs - histograms, pie charts, polar plots

Topics to Review (cont.)

Programming in MATLAB

- Logical Arrays
- Relational Operators
- Conditional Statements (if-else-end)
- “for-end” loops
- “while-end” loops
- “break” and “continue” commands
- Nested loops
- User defined functions

Design Project Introduction

Working in teams, write a Matlab code to design a three dimensional object considering:

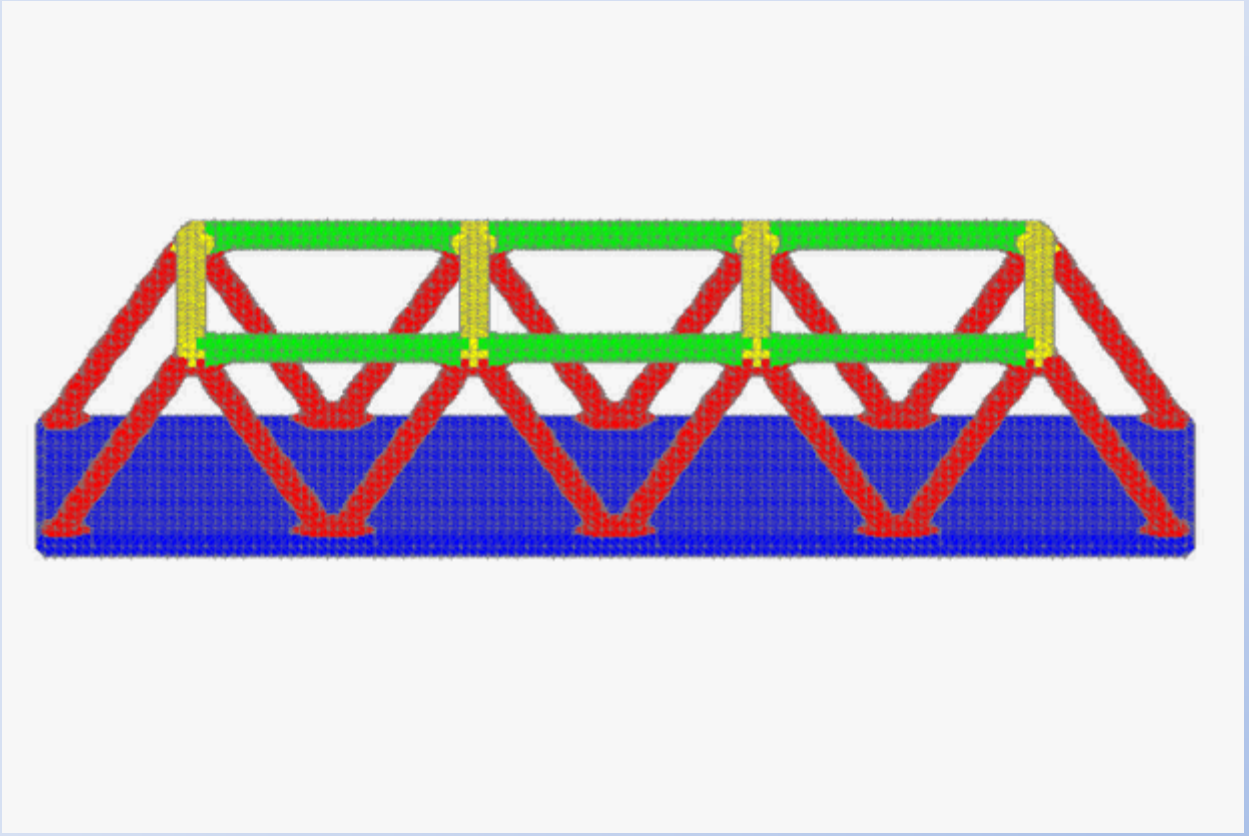
- functionality
- aesthetics
- use of color and texture

Design Project – Matlab tools

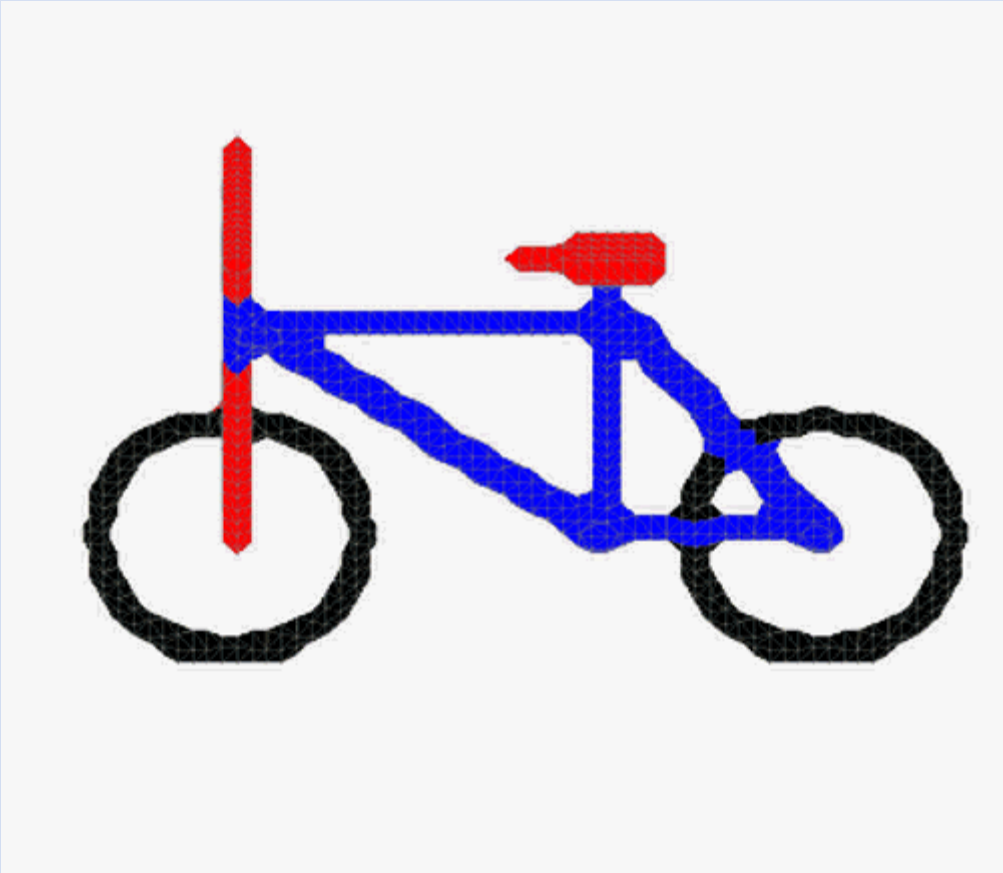
A collection of Matlab functions will be provided which:

- Define basic 3D shapes that can be added/subtracted to create a 3D object
- Display a preview of the design
- Provide ability to create objects with multiple colors and textures
- Generate a 3D CAD model (.obj format) which can be 3D printed (3D printing is not a project requirement)
- Create an animated GIF of model

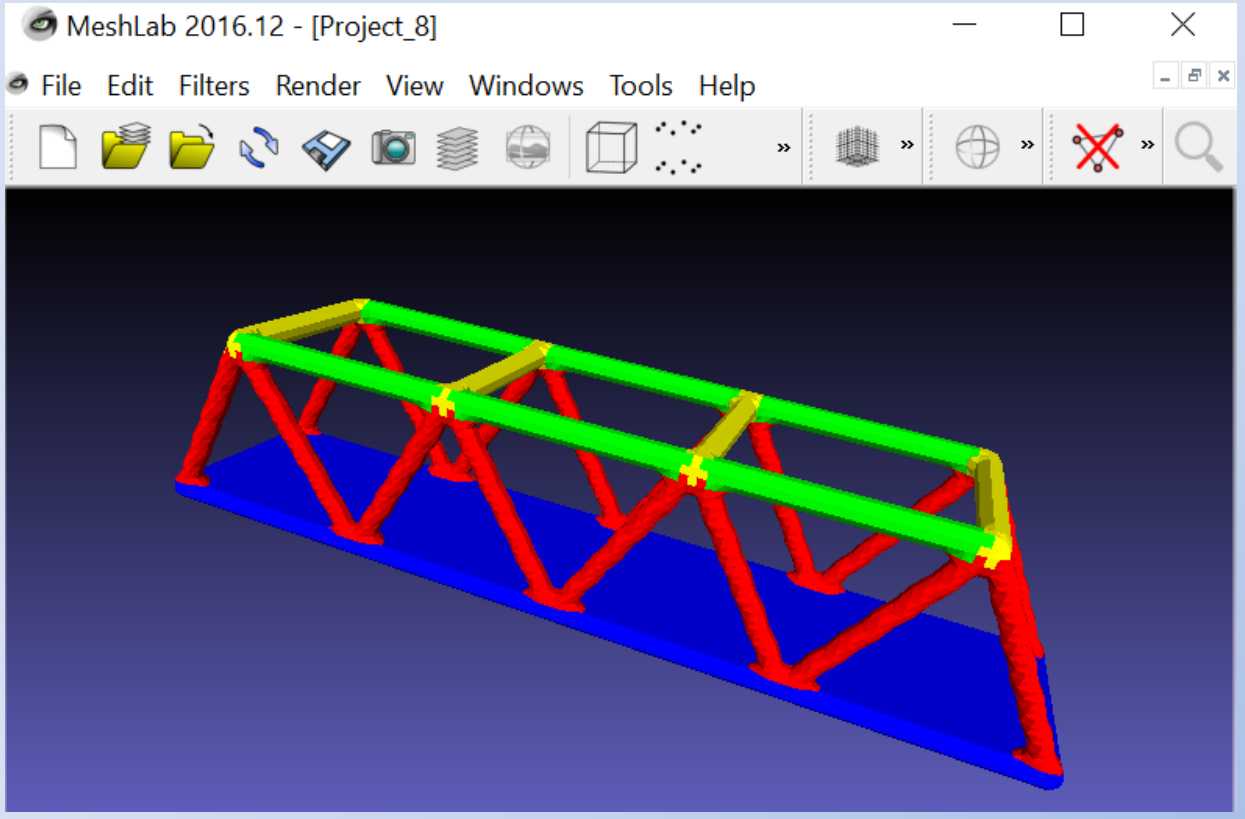
Design Project Example 1 – Truss Bridge



Design Project Example 2 - Bicycle



CAD File Viewer - Meshlab



Files Needed to View Truss in Meshlab

Files needed:

truss.obj – contains truss geometry

To view colors:

- colors.mtl
- Red.jpg, green.jpg, blue.jpg, yellow.jpg, magenta.jpg, cyan.jpg, white.jpg, black.jpg

Download truss.zip from Brightspace

Extract files (be sure all files are in same folder)

Installing and Running Meshlab

Free download from: http://www.meshlab.net/

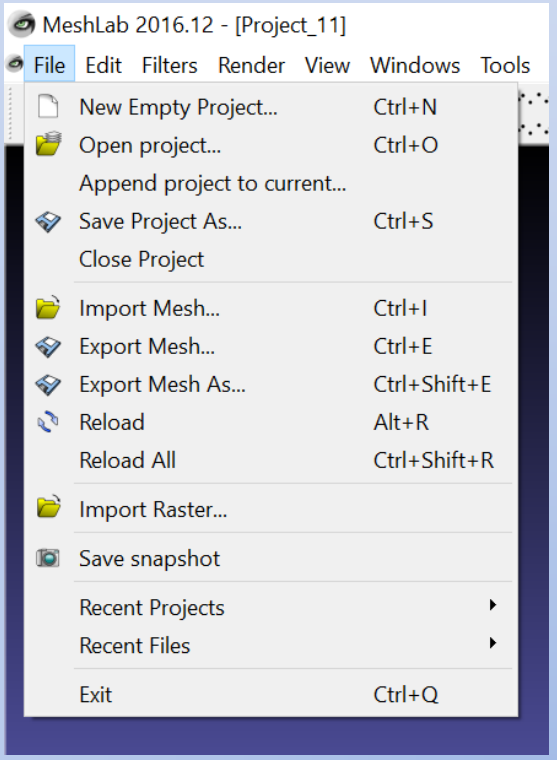
Available on ECC computers

To run:

- File => New Empty Project
- File=> Import Mesh
- Navigate and select truss.obj

If you don't see colors , select

- View => Show Layer Dialog
- Select => Color => Face



Design Schedule

Week 10

- Creating shapes

Week 11

- Creating and viewing 3D models

Week 12

- Adding color/texture, publishing your design

Week 13

- Preparing your final presentation

Design Project (cont.)

Deliverables (due last week of classes):

- Matlab code
- Graphic files (.obj, animated .gif and color/texture definition files)

Project Presentation

- Dates & Time: Finals Week
  - (based on lab section meeting time)
- Location: TBD

Design Project – First Steps

Think about possible objects or components you'd like to design

Think about possible teammates (Tuesday/Thursday instructors will coordinate team assignments)

Try viewing truss model

- Download 'truss.zip' from Brightspace
- Extract files (truss.obj, colors.mtl, red.jpg, etc.)
- Download and run Meshlab (or run on ECC computers)