

# NBCR SUMMER TRAINING PROGRAM 2017

## *Data to Structural Models*

### Agenda

#### **Day 1: Monday—August 7<sup>th</sup>**

Introduction to NBCR image analysis and segmentation tools. Segmenting large electron tomographic image volumes.

#### **Day 2: Tuesday—August 8<sup>th</sup>**

Creating high-quality triangular and tetrahedral meshes for numerical analysis from segmented image volumes with GAMer and Blamer.

#### **Day 3: Wednesday—August 9<sup>th</sup>**

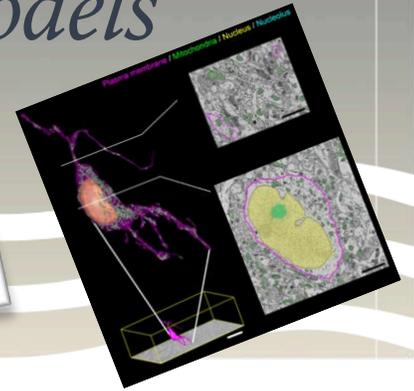
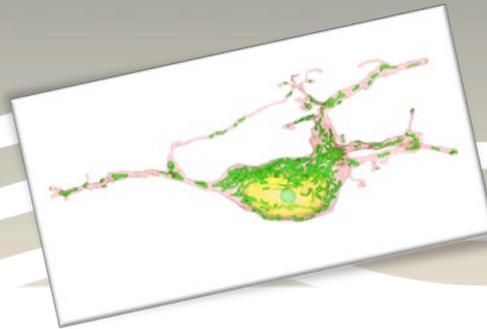
Using HexBlender to generate, refine and visualize high-quality hexahedral Lagrange and cubic Hermite meshes from segmented tomographic image volumes.

#### **Day 4: Thursday—August 10<sup>th</sup>**

Least squares fitting of three-dimensional anatomic models of geometry and structure using *Continuity*.

#### **Day 5: Friday—August 11<sup>th</sup>**

Open consultation on attendees' projects and a multi-scale modeling grant writing seminar.



**NBCR is pleased to offer a  
Summer Training Program (STP)  
August 7<sup>th</sup> — 11<sup>th</sup>, 2017**

on the theme of image-based meshing and structural modeling. This week-long intensive program will introduce 12-20 students to principles, methods, and NBCR tools for generating high-quality three-dimensional meshes for numerical analysis in multi-scale modeling of subcellular, cell, tissue, and organ biophysics.

**Structural models will be derived** from structural data obtained primarily from 3D imaging modalities, including electron tomography, multi-photon and confocal microscopy, and whole-body medical imaging modalities like CT and MRI.

**The course will include:** (1) automated and manual segmentation and annotation strategies; (2) improving the quality of surface meshes and generating volumetric meshes with GAMer; (3) using Hex-Blender to construct 3D models; and (4) developing high-order finite-element meshes, including patient-specific organ models with Continuity. The resulting meshes will be suitable for a range of biophysical modeling applications from stochastic Monte Carlo and Brownian Dynamics models to subcellular and whole-cell transport models to whole-organ biomechanics and electrophysiology that will be the topics of future NBCR training programs. In consultation with the course organizers, those accepted into the program will be encouraged to bring and work with their own data sets.



To register for this workshop please visit [nbcrc.ucsd.edu](http://nbcrc.ucsd.edu)