

FreeSurfer Summer Workshop Schedule

Hosted by CFMI @ Georgetown University

June 26 - 30, 2017

The FreeSurfer Summer Workshop was made possible by funds from the Center for Functional & Molecular Imaging (CFMI) for the purpose of fostering youth interest in the neurosciences and for the overall benefit of the Georgetown Academic community. This tutorial is intended for individuals with little to no experience in neuroscience, computer science or neuroimaging.

Goals

- Learn basic brain anatomy. Identification of different lobes, major landmarks and anatomical structures in MR images.
- Become familiarized with nuclear magnetic resonance imaging and how it is used for biomedical imaging.
- Develop proficiency with assessing MR image quality through visual inspection.
- Become familiarized with computational tools (i.e. FreeSurfer) for analyzing brain morphometry.
- Perform QC and editing of ADS structural MRI dataset.

Enrichment Opportunities

Psychology Department Career Panel

12:00 - 13:00 - Wednesday, June 28

Physics Colloquium: Engineering and Imaging Excitons for Brain Imaging of Modulatory Neurotransmitters

12:30 - 14:00 - Thursday, June 29

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MRI Summer Course Schedule

Dr. John VanMeter will offer bi-weekly courses/workshops on functional magnetic resonance imaging. This will allow students an opportunity to gain exposure to other forms of data acquisition using MRI, not just the structurals. Dates tentative and TBD.

July 17 - 20	Basic MR - Tissue Contrasts
August 1 - 4	Functional MR (T2*)
August 13 - 18	MR Spectroscopy
August 27 - 30	Diffusion

GUMC Career Symposium

12:00 - 13:00 Tuesday, August 8th

NRB Auditorium

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Monday, June 26th

10:00 - 11:00	Welcome Orientation & CFMI Tour Presentation 01	John provides introduction and welcome, maps of georgetown John gives presentation on important safety issues. <i>Breakfast provided</i>
11:00 - 12:00	Introduction to the Brain Presentation 02 Magnetic Resonance Imaging Presentation 03	John gives overview of goals for the Summer Camp & ADS project. John also provides a primer on the anatomy of the brain and how MRI is used to take pictures of the brain Anatomy Quiz
12:00 - 13:00	The Computer as a Laboratory for Science Presentation 04	Shady provides Introduction & familiarization with the computational environment, software and terminal
13:00 - 13:30	MRI Lab 1	Perform experiment in the MRI scanner (part I)
13:30 - 14:30	Lunch	<i>Lunch is provided @ Epicurean</i>
14:30 - 16:00	Assessing MR Images for Quality Presentation 05 Quantitative Quality Assessment Metrics Presentation 06	John trains everyone on MR image quality; Shady talks about SNR and other quantitative qa metrics

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Tuesday, June 27th

10:00 - 10:30	Review: Anatomy + MRI Image Quality Assessment	Guess the brain structure! Anatomy Quiz Quality assessment of example MR images.
10:30 - 11:00	MRI Lab 2	Perform experiment in the MRI scanner (part II)
11:00 - 12:00	MR Image Quality Lab	Students perform QA on 20 Subjects
12:00 - 13:30	Tour of the Medical Center Campus & Locations for Food + Go Cards	John leads tour through campus, terminates at the GoCard office <i>Lunch on your Own</i>
13:30 - 14:30	MR Image Quality Post Lab	Explore: 1. inter-rater-reliability from MR Image Quality Lab data, 2. the relationship between reliability and QA metrics and finally 3. general Q&A
14:30 - 15:00	Introduction to FreeSurfer + Hands On Image Viewing	Shady introduces FreeSurfer. Viewing of surfaces reconstructed from data acquired during previous day. Thought question: <i>How does motion affect the reconstruction?</i>
15:00 - 16:00	FreeSurfer Pipeline Overview	Detailed exposition of individual recon steps and what may go wrong at each of the steps. Command line tips & tricks. How to run a subject. Thought question: <i>Can we identify specific steps where motion affects the reconstruction?</i>

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Wednesday, June 28th

10:00 - 10:30	Anatomy Review	Anatomy Quiz
10:30 - 11:00	FreeSurfer Pipeline Walkthrough Part I	Part I : Recon-all steps 1-5 Intensity normalization, skull stripping, subcortical labeling
11:00 - 13:00	FreeSurfer Pipeline Walkthrough Part I: Inspecting Output	Visualizing intermediate results, inspecting the output, identifying and fixing errors in the brain mask.
13:00 - 14:00	Lunch	<i>Lunch on your own</i>
14:00 - 14:30	FreeSurfer Pipeline Walkthrough Part II	Part II: Recon-all steps 6-23 Registration, Intensity normalization, Non-Linear registration, Neck Removal, Subcortical Labeling,
14:30 - 16:00	FreeSurfer Pipeline Walkthrough Part II: Inspecting Output	Visualizing intermediate results, inspecting the output, identifying and fixing errors in the white matter mask and surfaces.

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Thursday, June 29th

10:00 - 10:30	FreeSurfer Pipeline Walkthrough Part III	Part III : Recon-all steps 24-31 Spherical mapping & registration, map average curvature to subject, cortical parcellation
10:30 - 11:00	FreeSurfer Pipeline Walkthrough Part III: Inspecting Output	Visualizing intermediate results, inspecting the final product
11:00 - 12:00	Review: FreeSurfer Pipeline Overview	Doesn't seem so complicated anymore does it?
12:00 - 13:30	Georgetown University Medical Center Welcome Luncheon	
14:00 - 16:00	Longitudinal Analysis of Structural Changes	

Friday, June 30th

10:00 - 11:00	Anatomy Review	Anatomy Quiz
11:00 - 12:00	Documenting FreeSurfer Edits	
12:00 - 13:00	Lunch	<i>Lunch on your own</i>
13:00 - 16:00	FreeHandsOn!	Hands on editing: begin editing training data set of 10 subjects

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From This Point Forward

Monday, July 3rd - Tuesday July 4th - HOLIDAY

Wednesday, July 5th

09:00 - 13:00 MRI Safety Training

Rest of the week (through to July 8th)

FreeHandsOn!

Continue working on training data set of 10 subjects.

Keep your own schedule between 10:00am and 4:00pm

Monday, July 10th thru 12th

Assess inter-editor-reliability. Just how different are all of your edits, how different do the final brain products look? What are the reasons for these differences? Q&A; 1-on-1 guidance.