**Fundamentals of Neuroimaging**  
**BENG 485b / 585b (WR)**

**Instructors:**  
D. S. Fahmeed Hyder <fahmeed.hyder@yale.edu>  
203-785-6206 (Fahmeed Hyder) or 203-785-6199 (Lesley Nadeau)

Douglas L. Rothman <douglas.rothman@yale.edu>  
203-785-6202 (Douglas Rothman) or 203-785-6199 (Lesley Nadeau)

**Time:**  
Wednesday, 3:30-5:30 pm

**Location:**  
N135 TAC (300 Cedar Street)

**Section:**  
Immediately after class and via appointments conducted on-line using Zoom.

**Main text:**  
   (will be kept on reserve at the MRRC library; contact Lesley Nadeau)

**Secondary text:**  
1. On-line and photocopied materials will also be distributed when needed.  
2. “Dynamic Brain Imaging” (Humana Press 2009). Hyder  
   (will be kept on reserve at the MRRC library; contact Lesley Nadeau)  
   2013) Shulman (will be kept on reserve at the MRRC library; contact Lesley Nadeau)

**Goal:**  
To understand the neuroenergetic and neurochemical basis of several dominant  
neuroimaging methods, including fMRI. Topics will range from technical aspects of  
different methods to interpretation of the neuroimaging results. Controversies and/or  
challenges for application of fMRI and related methods in medicine will be identified.

**Workload:**  
Read 20-40 pages of main text each week. Engage in class discussions. Selected  
participants will present seminars in class.

Weekly synopsis (double spaced, no figures, 350 words maximum, 200 words minimum)  
- arguments for / against  
- be precise and succinct  
- feedback / questions on synopsis

Two up-to-date reports on chosen or assigned topics. Papers may be proposal style using  
principles presented in lectures.  
- Midterm paper 10 pages (double spaced without figures).  
- feedback on midterm paper  
- Final paper 15 pages (double spaced without figures).

**Credit requirements:**  
Students taking the course for credit will be graded based upon weekly class participation  
(33.33%) which includes attendance, discussion, and presentation, weekly 1-page  
synopsis reports of lectures (16.67%), and two papers (50%).

**Course evaluation:**  
What have you learned about writing in this course that you can use in future courses?
### Syllabus for BENG 485 / ENAS 585 “Fundamentals of Neuroimaging”

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<td>Lecture 2</td>
<td>DLR</td>
<td>Energy metabolism (Chapters 1 and 2)</td>
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<td>1/31</td>
<td>Lecture 3</td>
<td>FH</td>
<td>Principles of fMRI (Chapter 3 &amp; parts of Chapter 9)</td>
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<td>Bottom up cortical energy budget (Chapter 7)</td>
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<td>Lecture 5</td>
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<td>Neurotransmission &amp; Neuroenergetics (glutamate, GABA) (Chapter 4-6)</td>
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<td>Lasya/Dave</td>
<td>17O MRS and calibrated fMRI for energy (Chapter 8 &amp; 9)</td>
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<td>Lecture 7</td>
<td>Rosario/Ludivine</td>
<td>Bioelectricity &amp; Neuroanatomy (parts of Chapter 7 &amp; 10)</td>
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<td>Jacob/Alex</td>
<td>Relationship of energy and activity (Chapter 10)</td>
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<td>Joshua/William</td>
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<td>Brigita/Lili</td>
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<td>Lecture 13</td>
<td>Parthib/Kevin</td>
<td>Psychology: Mind and Brain (Chapter 15)</td>
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### Assessment:

- Attendance: 5
- Discussion: 10
- Presentation: 20
- Synopsis: 15
- Two Papers: 50
- Total: 100