MTR 6030 Disease Measurement Imaging Section

Meeting Days/Times	Course dates	Course Location
Tues & Thurs, 10:30AM – 12:00 PM	Sept 8 – Dec 8	Zoom link available in Canvas
Course Directors	**David Mankoff, MD, PhD** david.mankoff@uphs.upenn.edu **Yong Fan, PhD** yong.fan@uphs.upenn.edu	
Course Coordinator	Danielle Williams danwild@upenn.edu	

Description

Imaging Section of Disease Measurement is a course in the Masters in Translational Research Program. The course covers broad topics spanning Ultrasound, X-Ray, CT, MRI, PET, and Optical imaging as well as imaging analytics, and has a focus on quantitative imaging and data analytics methodologies in translational and clinical research. Lectures pair basic and clinical faculty and combine a methodology lecture with paper reviews led by the students to showcase how quantitative imaging and data analytics approaches are applied to clinical and translational science for aiding disease diagnosis, treatment evaluation, and outcome prediction.

The objectives of the course are to ensure the students to acquire the knowledge to:

- Rationally and effectively incorporate quantitative imaging technologies into the design of translational and clinical research protocols
- Gain a basic understanding of quantitative imaging and analytical methodologies used in clinical medicine and research
- Get familiar with advanced imaging analytical tools for computing quantitative measures from imaging data
- Approach imaging measurements (tests) as a mean of answering translational and clinical questions, and to be able to choose appropriate tests to answer the questions being posed

Attendance

Students are expected to attend and participate in all classes. If for any reason a student will not be in class, they should contact MSTR Course Coordinator prior to class to alert them of the absence. Two excused absences are allowed during the course. Additional absences result in points deducted from Attendance & Participation grade. If a class date conflicts with a holiday or religious observance, please contact the course coordinator. If an assignment is due during this time, please work with the course director and course coordinator to determine an alternative due date.

Academic Policies

For information on academic policies please refer to the MSTR Student Handbook. As a student at The University of Pennsylvania, you are required to uphold the Code of Academic Integrity. Specifically, this means that materials that you submit either online or in person should be independent works created by you that uphold all tenets of academic integrity (i.e. do not cheat, fabricate, or plagiarize, amongst

others). We encourage you to reach out to the course director or coordinator if you are not clear on what potential violations are.

Student Disabilities Services
The University of Pennsylvania provides reasonable accommodations to students with disabilities who have self-identified and been approved by the office of Student Disabilities Services (SDS). Please discuss your accommodations and your needs with instructors. If you have not yet contacted SDS, and would like to request accommodations or have questions, please use the MyWeingartenCenter portal to schedule appointments with staff. The office is located in the Weingarten Learning Resources Center at Hamilton Village, 220 S 40th St., Suite 260. All services are confidential.

Canvas
All course materials (ppts, announcements, lecture recordings) will be posted on Canvas. **Log in with Pennkey and Password at** https://canvas.upenn.edu

Grading
Attendance: 25%
Paper Presentations: 50%
Final Methods Presentation: 25%

In advance of each class session:

Faculty will provide slides and/or videos, readings to be reviewed by students in advance of the live class session. Faculty are encouraged to consider the key points and concepts they would like students to walk away from the material with after reviewing. These will be available to students via canvas no less than one week in advance of the course date.

The faculty selecting the article for the student led presentation portion must also provide the selected paper at minimum 2 weeks prior to the class session and ideally by Sept 1 to allow students to sign up at the start of the course. See more about paper selection for faculty below.

On the day of the session,
Part I (30 minutes):
The Faculty Topic Facilitator will start off the session with a few key discussion questions related to the material. They are welcome to have background slides with key points. After 25 minutes of discussion, the class will transition to the student led paper presentation and discussion. The paper may be provided by the same faculty topic facilitator or by a partner faculty member.

Part II Paper Presentations (45 minutes)

Reviews papers for the Imaging section of MTR 6030 are designed to introduce students to imaging measurements and methodology and to help them develop the skill of critical evaluation of imaging related journal articles. For each assigned paper, the student will play a lead role in the class session, together with the listed faculty member. (Students will typically be assigned 2-3 articles throughout the course.)

The review should entail not only reading the assigned article, but also doing background reading necessary for the article, including obtaining important references. The student in charge of the review should understand the objectives and methodology described in the article and review background materials and referenced articles. Students are encouraged to seek the advice of the assigned faculty member for the article, when feasible. Discussions of the articles will also depend upon having all students read assigned articles in sufficient depth to participate in a critical discussion of the article.

Reviews should follow a standard format for discussing the article. The format for article review will be as follows:

Format for Paper Presentations:

I.   Expectation of the assigned faculty member:
  a.   Selects a paper and provides to the course coordinator at minimum two weeks before their session date.
  b.   When selecting paper, carefully considers the discussion points for the student critique (listed below as well as the opportunity to highlight diverse voices in research. There are many types of diversity to consider: ethnicity, race, geography, disability, age, gender identity, socioeconomic, sexual orientation.   This webpage contains a number of ways to search for diverse leaders in your area of research:
       https://www.theopennotebook.com/finding-diverse-sources-for-science-stories/ .

  c.   The main role during the session is to help to guide the paper discussion, led by the assigned student. The assigned student first presents the paper, followed by student led discussion of paper elements (see below). If desired, the assigned faculty member may put together a short 5-7minute slide presentation to provide some context for the assigned paper, after the student presentation, or close to the end of the discussion (optional).

II.   Expectations of the Presenting Student:
Student Brief Summary of Paper (5-10 min., 5-10 slides at most)
1. Objectives/hypothesis
2. Methods
3. Results
Summary of the article to identify the salient points of the paper for review, in the categories suggested above.

Student Critique (30 min., leading group discussion together with assigned faculty member)
Group discussion led by the person reviewing the paper. Consider using the NIH National Institute on Minority Health and Health Disparities Research (NIMHD) Research framework as a touchpoint for your critique: https://nimhd.nih.gov/about/overview/research-framework/nimhdframework.html

The following questions should serve as a guideline for this discussion:

1. **Objectives** - Are the hypothesis and/or objectives clearly stated? Are they worth investigating?

2. **Methods** - Are the methods described clearly? (i.e. Could you repeat what the authors have done based upon their description?) Are the methods valid? What are the potential pitfalls?

Biostatistical methods should be described. For clinical studies, the patient population included should be considered, including appropriate representation of ethnicity, race, geography, disability, age, gender identity, socioeconomic, sexual orientation.

3. **Result**s - Are the results clearly stated? Do they follow from the methods? Are the appropriate analysis methods used?

4. **Discussion and Conclusion** - What is the significance of the results? What can you conclude from this paper? What topics need to be addressed and what future investigations are suggested?

Final Methods Presentations: Dec 6 and Dec 8

- Students will give a 15-minute presentation focusing in on one Measurement Methodology from their MSTR research proposal.
- Students should be prepared to present any of the dates.
- If you know you will be absent on one of the dates, please make arrangements with the course directors well in advance to present on a specific date.

Presentation Format – 15 minutes maximum

- Brief Introduction to general area of research, Aims, Objectives, Hypothesis
- Discuss in detail the Approach
  - Study design, measurements/methodology, and data analysis plan
  - Pitfalls/Uncertainties