



Princeton  
Internships in  
Civic  
Service

## **PICS 2010 Internship Description**

**Organization Name:** American College of Radiology Imaging Network

**Internship Location:** Philadelphia Center City

**Required Dates:** Yes  No  If yes, internship must start on: \_\_\_\_\_ and end on \_\_\_\_\_ or  
must include the period:

**Housing Will Be Available to Intern:** Yes  No  If yes, housing will be free:  or housing  
will cost the student:

### **Expected working schedule for this internship:**

Start Time: 8:30 am                      End Time: 5:00 pm  
Lunch break: 1 HR (duration)                      (specific time, if applicable)

### **Additional Information, if necessary:**

(Please indicate if any of the preparation work will take place outside of the regular work schedule)

## **Organization Description**

*Please describe your organization briefly, including mission statement, activities, size etc. Please also explain the benefit that will be derived by your organization by sponsoring a Princeton intern.*

ACRIN – with Headquarters offices in Philadelphia - is funded by a grant from the National Cancer Institute (NCI) to develop and carry out trials related to medical imaging. ACRIN's mission is:

By conducting clinical trials of diagnostic imaging and image-guided treatment technologies to allay the fears of those who do not have cancer and lengthen and improve the quality of lives of cancer patients.

As this mission statement indicates, ACRIN's principle activity is the development, implementation, analysis, and promulgation of the results of rigorous clinical trials. Clinical trials are the scientific means by which medicine determines the validity of replacing older diagnosis and treatment methods with newer ones, in order to translate laboratory discoveries into clinical applications.

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ACRIN accomplishes this goal through an all-electronic network (Web, email, telephone) of hundreds of physicians, scientists, and methodologists and approximately 120 hospitals and imaging centers. The Network is principally U.S.-based but increasingly involves overseas participants. ACRIN currently is working on over 20 clinical trials of varying size and addressing a wide range of medical imaging research questions.

ACRIN headquarters supports the conduct of imaging clinical trials by providing project management, protocol and regulatory assistance, data management and biostatistical services, and image capture, transfer and archiving capabilities.

More information about ACRIN can be found on the website at [www.acrin.org](http://www.acrin.org).

### **Internship Description**

*Describe in detail the work or project will do; please be as specific as possible. Please also explain the benefit that a student will obtain by interning with your organization.*

Daniel Rubin, MD, an imaging researcher at Stanford University and chair of the ACRIN informatics committee is the mentor for an imaging informatics project along with Mark Rosen, MD, PhD from the University of Pennsylvania and director of the ACRIN MRI/CT core laboratory.

#### **Project Background:**

The ACRIN Informatics Committee (AIC) is developing methods and tools to support the wide spectrum of ACRIN's clinical research. The key informatics issues AIC is tackling are (1) developing standard methods for describing imaging biomarkers that can serve as surrogate endpoints in clinical trials, (2) creating standards-based image annotation tools to enable radiologists to describe and measure imaging biomarkers in trials in a standard manner, and (3) adopting standard terminologies and common data elements to permit secondary analysis and reuse of ACRIN data.

Image-based biomarkers are becoming a critical component in clinical trials as they can provide an endpoint in clinical trials. Quantitative evaluation of image biomarkers is important to ensure accurate and reproducible assessment, as well as to detect early change. In this project, we will create tools to capture and analyze the rich image biomarker information. We will also undertake a demonstration project to prove the practical utility of this work. The National Cancer Institute's cancer Biomedical Informatics Grid (caBIG) project recently has created standards for Annotation and Image Markup (AIM). AIM provides a standard syntax for recording quantitative and semantic informatics in images and promotes reuse of such image data in future analyses.

#### **Project Activities Proposed:**

1. **Image biomarker survey:** Survey the existing imaging biomarkers being collected in ACRIN imaging trials (both for single time point and temporal studies), including quantitative (measured by radiologist or machines) and qualitative (visual observations) features being recorded from images.

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**2. AIM implementation pilot study:** Perform a pilot study to evaluate the utility of the caBIG Annotation and Image Markup (AIM) in enabling capture of quantitative and quantitative image biomarkers for ACRIN studies. Use current AIM-compliant tools to annotate images from an ACRIN study, creating machine-processable semantic image annotations. Assess usability and extend tools as necessary to be incorporated into ACRIN research process (e.g., multi-reader studies). Also develop requirements for image annotation and analysis that will be useful to the ACRIN Core Lab in future reader studies.

**3. Tool development to automate image biomarker assessment:** Develop tool to automate calculation of image-based biomarker metrics from AIM—e.g., pull out the lesions and generate the quantitative measures such as sum of linear dimension and automated RECIST scoring, summaries of biomarker characteristics over time, etc. Develop code to process AIM annotations from multiple readers to assess inter-rater agreement.

**4. Data analysis demonstration study:** Conduct a multi-reader study to review the morphologic classification of the breast cancers in 6657 (Mark Rosen has received approval from the 6657 trial committee to develop the nomenclature to test reproducibility of the classification of advanced breast cancer morphology and treatment response patterns). The review and data collection would be done using AIM and evaluate its utility in enabling the research. The study would also define primary and secondary breast cancer morphologies, as well as mixed response to chemotherapy, using AIM to record the controlled terms needed to describe these morphologies.

This proposed work will help the ACRIN Imaging Core Lab in creating standards-based infrastructure and in deploying standard measures of imaging biomarkers. It will also serve as an exploratory research and demonstration projects to exploit the capabilities of ACRIN informatics infrastructure and data resources.

Our project goals entail both informatics methods/tool development and data analysis that will benefit both the Informatics Committee in achieving its goals as well as the ACRIN Core Lab in developing robust tools to support multi-center trial research. The project will also further the aims of the 6657 trial group and the breast committee for pursuing novel data analysis within 6657 and for planning future trials of the role of MRI in neoadjuvant breast cancer therapy. The projects above can be scoped into a single projects according to the interests/skills of the candidate student.

It is expected that the student would produce a scientific publication at the conclusion of the work undertaken, describing tools developed and their evaluation in the context of the above use cases.

### Intern Qualifications

*Describe any particular skills, background, or qualities you are seeking in an intern.*

Programming experience (Java, Ruby, Python, and/or C++) is highly desired along with familiarity with XML/XML-Schema. However, we could craft the role of the student in the above projects according to skills/interest (e.g., image management, form development, data collection, help with data entry, etc).

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