Now Accepting Applications for July 1, 2019:
TL1 Postdoctoral Program in Clinical Research and Medical Informatics

Applications are rolling until all positions are filled.
Apply online using the application form found here

About: The TL1 Postdoctoral Program in Clinical Research and Medical Informatics is a National Research Service Award (NRSA) funded training program comprising participating degree programs at the University of Chicago and Rush University. The program will prepare postdoctoral trainees with clinical (MD, DNP, PharmD, DMD/DDS, etc.) or research degrees (PhD) for careers as independent and collaborative translational researchers with a focus on clinical research and medical informatics.

Trainees can be based at any ITM institution and will select one of two training pathways based on their research interests and training needs: the *Clinical Research Pathway* or the *Medical Informatics Pathway*. Depending on the selected pathway, trainees will enroll in either a master's program in clinical research or a master's program in biomedical informatics, with cross training provided in both focus areas. Trainees will select whether they will complete coursework and program activities at either UChicago or Rush, with some joint activities shared across both institutions. The trainee's research project and primary mentor can be based at any ITM institution. See *Program Activities* for more information.

Who should apply?

1) MD clinical fellows based at an ITM institution (UChicago, Rush, IIT, Loyola, NorthShore, or Advocate) who are interested in additional research training. These might be fellows currently in research years of their ACGME training or finishing their ACGME training.
2) Candidates with other doctoral level professional degrees (DNP, PharmD, DDS/DMD, etc.) at an ITM institution who are interested in research training.
3) PhD recipients committed to careers in clinical or translational research. Candidates may apply externally or from an ITM institution.
4) Prospective applicants who fall outside these categories should contact Kelsey Bogue to determine if they are eligible to apply.

MD candidates will need commitment letter from a unit leader (Fellowship Director/Section Chief/Department Chair) who is able to attest to institutional commitment for the candidate. This letter must confirm the following: 1). The section/department will take necessary steps to transition fellow to an Advanced Clinical Fellow (or their institution's equivalent) position by the start date of the TL1 appointment; 2). The section/department will cover the difference between the NRSA stipend provided by the TL1 grant, allocated according to years of experience, and the fellow's stipend level set by their institution's GME office; and 3). If awarded the TL1, the fellow will have at least 80% protected time during the appointment period for research and training activities.

PhD candidates will need to demonstrate a commitment to clinical and translational research in their application. Although it is helpful if PhD candidates applying externally have already identified mentors with whom they would like to collaborate, candidates will also be connected to and interviewed by potential mentors during the application process.

Candidates with clinical doctoral degrees other than an MD/DO, such as a PharmD, DNP, or DDS/DMD, should discuss with their department at their home institution about other requirements that they must meet prior to being appointed (i.e. must they have a particular appointment/position at the institution in order to receive a TL1 fellowship?)

Additional Eligibility criteria: All candidates must be U.S. citizens or permanent residents and have completed a professional doctoral degree (MD, DO, PharmD, DNP, DDS/DMD, etc.) or research degree (PhD) at the time of appointment. Dual degree recipients such as MD/PhDs are also welcome to apply.

Junior faculty are not eligible to apply.

Funding: Most fellows will receive funding through the TL1 for 2 years. However, it is possible that a postdoctoral student halfway through one of the approved master's degree programs may apply for the TL1 and receive funding for 1 year.

Fellowships pay a stipend based on NRSA stipend levels for postdoctoral fellows. For MD fellows, the NIH stipend is supplemented by funds from the home department in order to match the fellowship stipend level set by their institution's GME office and/or section.

The fellowship also provides funds to cover tuition and fees for one of the three master's programs described below and a modest amount of funds to cover training related expenses such as attendance at a national conference, poster printing, software, etc. The fellowship includes health insurance for the recipient fellow but does not provide coverage for vision, dental, or the fellow's family/spouse.

Please note that trainees are allowed a maximum of three years of NRSA support at the postdoctoral level.

All candidates will use the application form found here.

Program Activities

1. Participate in research and/or research training activities full-time. It is understood that MD fellows must often continue doing clinical work as a part of their research. Clinical time must be limited to 20% , averaged across the appointment period and based on a 40 hour work week.
2. Trainees will select a primary training pathway: Clinical Research or Medical Informatics. Depending on the selected training pathway, the trainee will enroll in one of three master's programs, described below. In most cases, coursework will be completed over two years. Trainees who wish to waive out of particular courses or degree requirements because they have prior training in these areas should describe their prior training experience in the application and suggest an alternative plan for coursework/training. After receiving conditional acceptance to the Tl1 program, trainees will be required to apply separately to the selected master's program in a timely manner, if not already enrolled.

   Clinical Research Pathway:
   - UChicago's Master of Science for Clinical Professionals (MSCP) – Informatics Track: Primary coursework is in clinical research with required electives in informatics. 9 for-credit courses

plus a master's thesis are required degree completion. See page 6 for more information about required coursework and example training timeline. Visit the MSCP degree webpage here.

- Rush's Master of Science in Clinical Research (MSCR) – please see page 8 or visit the Rush MSCR webpage for more information. Training in informatics is already built into the MSCR program. Trainees will have the option to enroll in advanced statistical coursework through UChicago.

Medical Informatics Pathway:

- UChicago's Master of Science in Biomedical Informatics – Clinical and Translational Research Track: Primary coursework is in informatics with required electives in clinical research. 9 for-credit courses plus a for-credit capstone project are required for degree completion. See page 10 for more information about required coursework and example training timeline. Visit the MScBMI degree webpage here.

3. Trainee will identify and work with a primary mentor in his/her research field at any ITM institution to conduct a mentored research project. Please note that an appropriate research mentor does not need to be from the trainee's clinical discipline. Appropriate primary mentors include mid or senior level faculty with a track record of publications, grant funding, and mentoring. Trainee and primary mentor will work together to establish an interdisciplinary mentorship team.
4. Training in Regulatory Processes: MSCR students at Rush receive this training as a part of their master's degree. Trainees based at UC in either the MSCP or MScBMI programs will participate in an additional non-credit mini-course or online module in this domain.
5. Trainees at UC will attend regularly and present once per appointment year in the Outcomes Research Workshop (ORW), which occurs weekly on Wednesdays from 8:30-9:45. Trainees at Rush participate in a monthly seminar series in their home department. Remote attendance for fellows based at Rush will be allowed.
6. Participation in the joint UC-Rush Translational Research Seminar, which will occur monthly on Wednesday mornings in place of ORW from 8:30-9:45 am.
7. Participation in the Annual ITM Clinical and Translational Science Symposium.
8. Trainees must participate in a writing workshop. Trainees at Rush receive grant writing training as a part of the MSCR program. Trainees at UChicago must participate in either the summer Research Proposal Development Workshop or the Career Award Writing Workshop.
9. Team Science Online Learning Modules: Trainees must complete all four modules found here.
10. Training in the Responsible Conduct of Research: All trainees must complete in person RCR training during postdoctoral research training. Two examples of approved RCR training include the ITM's RCR summer course and the Essentials of Patient Oriented Research winter course. Trainees must also complete two online trainings:
    a. CITI training in Human Subjects Protection
    b. Good Clinical Practice training through NIH

Reporting requirements

1. Trainees must submit quarterly learning plans to TL1 administrator. Trainees must review and obtain comments from their primary mentor at the bottom of the form.
2. Trainees must abide by all NIH/NRSA reporting requirements including reporting funding on all publications and presentations and submitting all journal articles to the PubMed Central database in accordance with the NIH public access policy.

3. At the start of the first year of the TL1 appointment, trainees must complete an NIH payback service agreement, which states that for the first 12 months of an appointment
4. While in the program trainees agree to submit information as needed to the program administrator on an annual basis for progress reports and future renewal applications. Trainees agree to complete all necessary paperwork in a prompt and timely manner.
5. Trainees agree to provide the training program administrator an updated CV, as requested, once per year after completing the program for program evaluation purposes.

Application

Applications are currently being accepted for a July 1, 2019, start date.

We are accepting applications from:

- Candidates requesting two years of funding.
- Candidates requesting one year of funding who are partway through one of the approved master's degree programs

Applications will start being reviewed in October 2018 and will continue being accepted until all positions are filled. You may contact Kelsey Bogue to confirm if there are still positions available before you apply.

Candidates must submit their materials through the online form found here.

Application materials include:

1. CV
2. Personal statement describing career goals, research interests, and how the training program will help the candidate reach these goals. Maximum of 1500 words. Applicants may also describe how prior coursework may be duplicative of training in chosen master's degree and request a waiver for these courses. It is desirable but not required to describe how the proposed research aligns with Healthy Chicago 2.0 goals.
3. Three letters of recommendation. One letter should be from the trainee's proposed primary mentor (if applying internally from an ITM institution). This letter should include a justification of why the faculty member is an appropriate research mentor for the candidate, including a description of the mentor's record of publications, grant funding, and mentoring. At least one of the other two letters should be from a faculty who can speak to the candidate's ability or promise in clinical and/or translational research.
4. Official undergraduate and graduate (PhD, MD, etc.) transcripts. Please send transcripts to kbogue@bsd.uchicago.edu.
5. Letter of commitment from unit leader (fellowship director, section chief, or department chair) who is able to attest to institutional commitment for candidate (MDs only): This letter should include the following commitments: 1). The section/department will take necessary steps to transition fellow to an Advanced Clinical Fellow position by the start date of the TL1 appointment; 2). The section/department will cover the difference between the stipend provided by the TL1 grant, allocated according to years of experience, and the fellow's stipend level set by the GME office; and 3). If awarded the TL1, the fellow will have at least 80% protected time during the appointment period for research and training activities.

6. Job market paper and/or first author publications (required for PhD candidates; optional for MDs): All PhD applicants must submit a job market paper and/or other first author publications. Candidates may submit up to three papers in their application, combined as one PDF. MD applicants are welcome to submit writing samples but this is not required.

Applications will be reviewed by the TL1 program directors and steering committee. Candidates in consideration for a fellowship position will be invited to interview, either in person or over the phone.

Contact

Please contact Kelsey Bogue at kbogue@bsd.uchicago.edu with any questions about the TL1 program and she can direct you to the appropriate contact as needed.

Required Coursework and suggested timeline for MSCP- Informatics Track (UChicago)

Course Title and Number	Description	Suggested Term (credit units)
Clinical Epidemiology PBHS 30700	Clinical epidemiology is the "application of epidemiologic principles and methods to problems encountered in clinical medicine." This course introduces the basic principles of epidemiologic study design, analysis and interpretation, with a particular focus on clinical applications. The course includes lectures and discussions based on critical appraisal of significant research articles.	Summer 2018 (100)
Introduction to Biostatistics PBHS 32100	This course will provide an introduction to the basic concepts of statistics as applied to the bio-medical and public health sciences. Emphasis is on the use and interpretation of statistical tools for data analysis. Topics include (i) descriptive statistics; (ii) probability and sampling; (iii) the methods of statistical inference; and (iv) an introduction to linear and logistics regression.	Summer 2018 (100)
Applied Regression Analysis PBHS 32400	This course introduces the methods and applications of fitting and interpreting multiple regression models. The primary emphasis is on the method of least squares and its many varieties. Topics include the examination of residuals, the transformation of data, strategies and criteria for the selection of a regression equation, the use of dummy variables, tests of fit, nonlinear models, biases due to excluded variables and measurement error, and the use and interpretation of computer package regression programs. The techniques discussed are illustrated by many real examples involving data from both the natural and social sciences. Matrix notation is introduced as needed.	Fall 2018 (100)
Epidemiologic Methods PBHS 31001	This course expands on the material presented in "Clinical Epidemiology," further exploring issues in the conduct of epidemiologic studies. The student will learn the application of both stratified and multivariate methods to the analysis of epidemiologic data.	Winter 2019 (100)
Biostatistical Methods PBHS 32700	This course is designed to provide students with tools for analyzing categorical, count, and time-to-event data frequently encountered in medicine, public health, and related biological and social sciences. This course emphasizes application of the methodology rather than statistical theory (e.g., recognition of the appropriate methods; interpretation and presentation of results). Methods covered include contingency table analysis, Kaplan-Meier survival analysis, Cox proportional-hazards survival analysis, logistic regression, and Poisson regression.	Winter 2019 (100)
Health Services Research Methods PBHS 35100	The purpose of this course is to better acquaint students with the methodological issues of research design and data analysis widely used in empirical health services research. To deal with these methods, the course will use a combination of readings, lectures, problem sets (using STATA), and discussion of applications. The course assumes that students have had a prior course in statistics, including the use of linear regression methods.	Spring 2019 (100)
Introduction to Clinical Trials PBHS 32901	This course will review major components of clinical trial conduct, including the formulation of clinical hypotheses and study endpoints, trial design, development of the research protocol, trial progress monitoring, analysis, and the summary and reporting of results. Other aspects of clinical trials to be discussed include ethical and regulatory issues in human subjects research, data quality control, meta-analytic overviews and consensus in treatment	Spring 2019 or Spring 2020 (100)

	strategy resulting from clinical trials, and the broader impact of clinical trials on public health.	
Introduction to Biomedical Informatics MSBI 31100	This course will cover the fundamentals of informatics as it applies to health care and research. Specific topics will include: radiology, imaging, and nursing informatics; using clinical data for research; overview of bioinformatics; coding in clinical care and billing; terminologies and ontology mapping; security and privacy including HIPAA and HITECH; mobile health and telemedicine; human-computer interaction; decision support; meaningful use; quality reporting; the Affordable Care Act; and clinical laboratory informatics.	Fall 2018 or Fall 2019 (100)
MSBI	One additional MScBMI elective	(100)
Total credits required	*9 for-credit courses + non-credit master's thesis*	*900 credit units*

MSCP students also complete a master's paper; this is separate from the TL1 mentored research project.

PBHS courses are taught during the week, M-F, between 9am and 5pm. Biomedical Informatics (MSBI) courses are typically offered in the evenings or on weekends.

Trainees may stray from the proposed timeline above, although it is the trainee's responsibility to ensure all coursework and degree requirements are met by the end of two year TL1 fellowship period.

Learn more about the MSCP degree here.

Required Coursework and suggested timeline for MSCR (Rush)

Course Title and Number	Description	Suggested Term (semester hours)
Clinical Trials I CRE 557	Presents an overview of clinical trial design, including large simple trials, randomized double-blind trials, crossover trials, parallel studies, enrichment studies, as well as other designs. Topics covered include formulation of the Research Question, measurement of outcomes, studies in special populations, determining sample size, techniques of randomization and blinding, subject recruitment, observational studies and different types of small randomized studies. The course addresses how studies are designed to answer specific research questions.	Fall 2018 (2)
Clinical Trials II CRE 558	This course is a continuation of Clinical Trials I, covering genetic data and the era of personalized medicine, assessing and reporting of adverse events, assessment of quality of life, the function of Data and Safety Monitoring Board, techniques involved in the study closeout, methods of reporting and interpreting clinical trials, economic analysis in clinical trials and the emerging field of comparative effectiveness research. The course also focuses on protocol applications of clinical trials design and data interpretation.	Fall 2018 (2)
Biostatistics I GCC 546	Covers statistical issues in clinical trial design. This includes blinding, randomization, bias and intent to treat; use of descriptive statistics and graphical techniques to explore patterns in data; and a review of the basic properties of probability and the characteristics of the normal and binomial distributions. One and two sample inference and hypothesis testing for proportions, means and medians, one-way analysis of variance and simple linear regression, including diagnostics based on residuals and confidence intervals for regression coefficients are covered. Hypotheses testing for cross-classified data are also discussed.	Fall 2018 (2)
Bioinformatics I GCC 548	This course presents introductory material on methods and procedure of bio-informatics and how it may be helpful in undertaking clinical trials.	Fall 2018 (1)
Ethics in Biomedical Research & the IRB GCC 551	This course covers the role of the institutional Review Board in Clinical Research. The course includes didactic lectures on the requirements of informed consent, regulatory processes, intellectual property, the role of the office of research integrity as well as a required participation on IRB review panels at the Rush.	Fall 2018 (2)
Tools for Research PHR 556	This course focuses on the practical computer skills required to work as a scientist in modern times. It includes didactic lecture and computer practice on PubMed, reference programs, Excel, Adobe Photoshop, Sigma Plot and importing into Word . Finally students are introduced to the research section of the NIH website with the emphasis on finding grant information and the mechanisms of online grant applications.	Fall 2018 (1)
Biostatistics II GCC 549	Covers multifactor analysis of variance, multiple regression, logistic regression including Hosmer-Lemeshow goodness-of-fit and receiver-operating curves. Survival analysis including log rank tests, Kaplan-Meier curves and Cox regression are covered. Additionally, statistical software packages such as SAS or SPSS are discussed	Spring 2019 (2)
Bioinformatics II GCC 549	Continuation of Bioinformatics I.	Spring 2019 (1)
Intro to	Lecture covers the process of Drug and Device Discovery, the IND or IDE	Spring 2019

Regulatory Process: Drug Discovery and Development GCC 552	process, preclinical research, clinical research process for Drug and Device studies, New Drug application, international drug development guidelines, IRB in drug research, device development, reporting adverse drug reactions, the use of biologic markers in trials, drug metabolism, Genetics in Drug Development and orphan drug development, as well as PK/PD modeling in Drug Development.	(2)
Epidemiology PVM 553	Course will provide an in-depth description of case control and cohort studies. This includes the different types of studies, their strengths, weaknesses and uses; the definition and selection of cases and controls; matching and sampling; the definition and selection of exposure and comparison groups; the ascertainment of disease status and exposure status; and issues in analysis and interpretation of data, including the role of bias, the effect of nonparticipation and loss to follow-up and the application of various analytic approaches. The computation, interpretation and application of basic epidemiologic concepts and statistics will be reinforced throughout the course, including measures of disease frequency and measures of association.	Spring 2019 (1)
Thesis Research CRE 597	For students in the Master of Science in Clinical Research program to undertake thesis research. Participation requires a research mentor.	Summer 2019 (4)
Readings in Special Populations CRE 559	This course consists of seminars evaluating clinical research studies in the literature. Each seminar will evaluate a clinical study, its attributes and the methodological problems. Many of the studies discussed will have been undertaken by Rush Clinical Investigators and one of the investigators will lead the discussion.	Fall 2019 (1)
Thesis Research CRE 597	For students in the Master of Science in Clinical Research program to undertake thesis research. Participation requires a research mentor.	Fall 2019 (4)
Grantsmanship GCC 593	This course is designed to provide the practical aspects of a grant proposal submission. In addition to covering basic writing skills, the course addresses specific elements that should be included in each of the various sections of federal grants, foundation applications and biotech contracts. In addition, it talks about ways of identifying sources for funding, a survey of the NIH landscape and how to prepare budgets.	Fall 2019 (1)
Readings in Clinical Research CRE 523	This course consists of seminars evaluating clinical research studies in the literature. Each seminar will evaluate a clinical study, its attributes and the methodological problems. Many of the studies discussed will have been undertaken by Rush Clinical Investigators and one of the investigators will lead the discussion.	Spring 2020 (1)
Thesis Research CRE 597	For students in the Master of Science in Clinical Research program to undertake thesis research. Participation requires a research mentor.	Spring 2020 (5)
Total credits required	*13 courses (1-2 hours each) + for-credit thesis*	*32 semester hours*

MSCR students complete a master's thesis; this thesis overlap with the TL1 project.

With the exception of the IRB modules, all classes in the first year of the MSCR program are scheduled on Tuesdays and Thursdays from 3:30 to 7:00 p.m.

It is the trainee's responsibility to ensure all coursework and degree requirements are met by the end of two year TL1 fellowship period.

Learn more about the MSCR program here.

Required Coursework and Suggested timeline for MScBMI- Clinical Translational Research Track (UChicago)

Course Title and Number	Description	Suggested Term (credit units)
MSBI 30100	Introduction to Biostatistics Prerequisite (if needed)	Summer 2018 (0)
Introduction to Biomedical Informatics MSBI 31100	This course will cover the fundamentals of informatics as it applies to health care and research. Specific topics will include: radiology, imaging, and nursing informatics; using clinical data for research; overview of bioinformatics; coding in clinical care and billing; terminologies and ontology mapping; security and privacy including HIPAA and HITECH; mobile health and telemedicine; human-computer interaction; decision support; meaningful use; quality reporting; the Affordable Care Act; and clinical laboratory informatics.	Fall 2018 (100)
Concepts in Computer Programming MSBI 31300 OR Advanced Concepts in Computer Programming 31600	This course will provide an introductory and intermediate level overview of computer science and programming for students who are not working in technology-based professions. Students will learn concepts in computer programming and how programming language works, as well as theories behind information system design and management. Specific topics include: Python programming language; fundamental data structure; algorithm design; basic project management of development projects. (31300) The advanced concepts course introduces students to advanced concepts through real-world "end-to-end" case studies. Additionally, this course will provide a comprehensive introduction to the domain of biomedical informatics from a computer programming perspective and will also provide implementation examples that are representative of problems that practitioners in the medical field have to solve. During the course, students will learn how biomedical informaticists access and process healthcare and medical data. Topics will include: common IT methods and tools, important numerical algorithms, commercial products as well as open-source tools and libraries. (31600)	Fall 2018 (100)
Applied Research/Clinical Informatics MSBI 31400	This course will enable students to focus on applying informatics methods to real-world scenarios. The course will be customized for students wanting to pursue research or clinical informatics projects. In the research group, we will use a case-study based approach to identify appropriate datasets, use analytic tools to analyze data, evaluating hypotheses, and interpret results. In the clinical group, we will focus on the methods of diagnosing issues within current or proposed clinical systems, using informatics to address issues, and evaluate the results.	Winter 2019 (100)
Leadership and Management for Informaticians MSBI 31200	This course will introduce students to key concepts in project management and team building for biomedical informatics projects. Specific topics will include: defining project scope, goals, and metrics; managerial supervision; team motivation; team communication and conflict resolution; and communication during and after projects to maximize success and impact.	Winter 2019 (100)
Ethics and Policy Questions: Genomics, Health Care, and Big Data	This course will provide students with an understanding of critical ethical, legal and social issues related to biomedical informatics, with an emphasis on policies in the US. Specific topics include: balancing privacy and discovery in the context of big data analysis; data stewardship; human genomic data; implications of future innovation for privacy and ethics; and guarding against	Spring 2019 (100)

MSBI 31500	misuse of data.	
Applied Regression Analysis PBHS 32400	This course introduces the methods and applications of fitting and interpreting multiple regression models. The primary emphasis is on the method of least squares and its many varieties. Topics include the examination of residuals, the transformation of data, strategies and criteria for the selection of a regression equation, the use of dummy variables, tests of fit, nonlinear models, biases due to excluded variables and measurement error, and the use and interpretation of computer package regression programs. The techniques discussed are illustrated by many real examples involving data from both the natural and social sciences. Matrix notation is introduced as needed.	Fall 2019 (100)
Biostatistical Methods PBHS 32700	This course is designed to provide students with tools for analyzing categorical, count, and time-to-event data frequently encountered in medicine, public health, and related biological and social sciences. This course emphasizes application of the methodology rather than statistical theory (e.g., recognition of the appropriate methods; interpretation and presentation of results). Methods covered include contingency table analysis, Kaplan-Meier survival analysis, Cox proportional-hazards survival analysis, logistic regression, and Poisson regression.	Winter 2020 (100)
Introduction to Clinical Trials PBHS 32901	This course will review major components of clinical trial conduct, including the formulation of clinical hypotheses and study endpoints, trial design, development of the research protocol, trial progress monitoring, analysis, and the summary and reporting of results. Other aspects of clinical trials to be discussed include ethical and regulatory issues in human subjects research, data quality control, meta-analytic overviews and consensus in treatment strategy resulting from clinical trials, and the broader impact of clinical trials on public health.	Spring 2019 or Spring 2020 (100)
MSBI	One additional MScBMI elective	(100)
MSBI 39902	Capstone Project Proposal	(100)
MSBI 39903	Capstone Project Implementation	(100)
MSBI 39903	Capstone Project Writing and Presentation	(100)
Total credits required	*9 for-credit courses + for-credit capstone*	*1,200 credit units*

Students without prior coursework in statistics should enroll in the Introduction to Biostatistics Prerequisite offered each summer prior to starting MScBMI coursework. The fee will be paid by the TL1 grant.

MScBMI students are required to complete a capstone project and enroll in courses for various stages of the capstone completion: 1). Proposal, 2). Implementation, and 3). Writing and Presentations. The content of the capstone may overlap with the trainee's TL1 mentored research project.

Unless otherwise noted, all courses are offered at least once per year. Public Health Science (PBHS) courses are taught during the week, M-F, between 9am and 5pm. MScBMI courses are typically offered in the evenings and/or on weekends.

Trainees may stray from the proposed timeline above, although it is the trainee's responsibility to ensure all coursework and degree requirements are met by the end of two year fellowship period. Learn more about the MScBMI degree here.