MASTER OF SCIENCE PROGRAM IN

CLINICAL AND POPULATION TRANSLATIONAL SCIENCE

THE DIVISION OF PUBLIC HEALTH SCIENCES
IN ASSOCIATION WITH
THE TRANSLATIONAL SCIENCE INSTITUTE

WAKE FOREST UNIVERSITY
GRADUATE SCHOOL OF ARTS & SCIENCES
BOWMAN GRAY CAMPUS

PROGRAM HANDBOOK

August 2011

If you have further questions after reading this handbook,
please contact the Program at cpts@wakehealth.edu.

BACKGROUND AND PHILOSOPHY

The Master of Science degree in Clinical and Population Translational Science (CPTS) was initiated in the fall of 2008. The Program replaced the Health Sciences Research Master of Science Program and over 15 years of similar graduate research degree programs. The CPTS Program is co-administered by the Division of Public Health Sciences and the Wake Forest University Translational Science Institute (WFU TSI). This Program is among a small number of similarly structured graduate programs in the United States, placing it on the cutting edge of graduate education.

Major changes have occurred in basic, clinical and population-based research in the last several years. In the past, basic, clinical and population-based researchers operated in separate domains, often without substantive interactions. This model of research has created barriers to translating research into practice. At present, and increasingly in the future, it will be necessary for scientists to be able to collaborate effectively across the research spectrum to accelerate the translation of knowledge into improvements in human health.

Within the field of clinical research, morbidity and mortality have been the primary outcomes assessed to evaluate treatment effectiveness. However, patient and provider satisfaction, health-related quality of life, health care expenditures, and cost-effectiveness are now evaluated with great regularity. This shift in emphasis is being driven, in part, by the changing health care system, which is demanding more complete information on physician practice patterns, clinical/patient outcomes, and the cost-effectiveness of therapies across a wide range of medical conditions. In addition, health outcomes and services are becoming more central to the funding structures of health care research. For example, the National Cancer Institute strongly encourages the inclusion of health-related quality of life and economic impact measures in clinical trials. These factors are also becoming more central in the drug approval process, making the assessment of these outcomes more critical in the pharmaceutical industry.

In response to these changes, academic medical centers are redesigning their clinical delivery systems to conform to a system configured around capitated payment and fixed populations of patients in defined communities. Physicians and other health care professionals are also being asked to assume roles quite different from the traditional roles for which they were trained. Among these new roles are the responsibility for the delivery of cost-effective health care and preventive services to communities; the allocation of scarce health care resources; and the assessment of medical treatment effectiveness, including the evaluation of patient outcomes such as health-related quality of life. Academic research in health care also requires a broader combination of skills to more effectively examine the etiology, detection, prevention, and treatment of disease, in order to better inform the health care delivery system. Increasingly, multidisciplinary teams of researchers are required to address the complex research questions of importance in clinical research.

Within the field of population-based research, the linkages between public health and medical approaches to improving health are increasingly recognized. The Medicine and Public Health Initiative, an alliance of the American Public Health Association and the American Medical Association, has focused on engaging leading medicine and public health organizations and individuals in efforts to reshape health education, research and practice. This includes a focus on putting evidence-based results into practice through applied and translational research. The clinical and population translational scientists of tomorrow must be prepared to conduct the research needed to advance methods for putting results we know into practice; to help determine gaps in coverage or in emphasis; to help assess ethical aspects of this research; to contribute to the determination of the long term cost-effectiveness of specific lines of research; to help develop public policy regarding areas of research development and implementation; and to help members of all health professions to become aware of and to utilize the most important research conclusions as they appear.

The combination of epidemiology; statistics; and clinical and population research methods into one program will provide students with the skills necessary to translate discoveries generated during laboratory research to human populations and to conduct research aimed at enhancing the adoption of best practices in health care settings and the community. Students also will be prepared to function in multidisciplinary teams that will conduct the translational research of the future.

PROGRAM OVERVIEW

The Master of Science (MS) Degree in CPTS is co-administered by the Division of Public Health Sciences and the Wake Forest University Translational Science Institute. Faculty members provide expertise and conduct research across the spectrum of basic, clinical, population, and translational research. The Program is managed by two Program Directors and a Program Coordinator, with additional leadership provided by a small group of faculty who form an Executive Committee. Unless otherwise noted, the Program follows the policies and procedures of the Wake Forest University Graduate School of Arts and Sciences (Bowman Gray Campus).

Formal coursework for the CPTS Program emphasizes biostatistics, epidemiology, and applied clinical and population research methods, along with the responsible conduct of research and scientific communication. Competencies addressed by the formal CPTS coursework include the ability to:

- Develop meaningful and feasible research questions based on literature review and appropriate biological and psychosocial conceptual frameworks.

- Design and implement studies to answer research questions, with appropriate balancing of competing considerations involved in decisions about study design; participant sampling and recruitment; and approaches to data collection.

- Perform and interpret statistical analyses based on a foundation of statistical literacy, with graduates able to perform basic analyses on their own and prepared to collaborate with statisticians for more complex analyses.

- Conduct research in a responsible and ethical manner.

- Communicate scientific concepts orally and in writing, including through grant applications, protocols, manuscripts, abstracts, and presentations.

- Collaborate productively in the context of multidisciplinary scientific teams comprised of basic, clinical, and population scientists.

The course sequence and descriptions are provided below.

In addition to formal coursework, all students pursuing a Masters degree in CPTS are required to complete a thesis of publishable quality that is closely aligned with the student's interests and career objectives. The thesis provides a capstone experience in which students apply the knowledge and skills obtained during their formal coursework. Further information about thesis requirements is provided in several following sections.

Students pursuing an MD degree at the Wake Forest University School of Medicine can incorporate the CPTS MS into their medical training, typically between the second and third years of medical school.

ADMISSION STANDARDS AND PROCEDURES

The CPTS Program is open to individuals who already hold or are pursing advanced degrees, such as the MD, DVM, ScD, PhD, DDS, DSN, MMS (Physician Assistants), or MSN, who are seeking training in the clinical and population aspects of translational research. The Program also may be appropriate for qualified applicants with at least a BA or BS in a social science, public health, or other health-related field, although additional post-baccalaureate course work is highly desirable. For applicants without an advanced degree, previous experience in a health-related field is required. All applicants must provide GRE, MCAT, or USMLE scores, to be forwarded by the testing institution directly to the Dean of the Graduate School.

Application decisions are made on a rolling basis beginning on January 15, the application deadline for the Graduate School. Available slots in the Program are typically filled by early May. New applications will not be accepted after the Program is filled. In addition to the required written application materials, applicants typically are interviewed by phone. Upon admission, all students must matriculate at the beginning of the subsequent fall semester; matriculation in the spring or summer semesters is not possible. Applications must be filed electronically through the Graduate School's application process. [Note that the web site was being revised at the time this handbook was prepared and thus we cannot provide a link.]

PARTICIPATION BY STUDENTS NOT ENROLLED IN THE CPTS PROGRAM

Students who wish to audit or take a course for credit in our Program must either be enrolled in another WFU graduate program or receive special student status from the Graduate School. Students must meet course prerequisites and receive approval to register. When CPTS courses are oversubscribed, priority will be given to full-time students whose program requires the course; auditors will be the lowest priority. Neither a tuition scholarship nor laptop computer will be available to auditors. Auditors are welcome to attend lectures but should not expect to participate fully in course activities or have assignments evaluated.

FINANCIAL CONSIDERATIONS

The Graduate School sets tuition and fees, and provides information regarding financial aid. The CPTS program has a limited number of tuition scholarships available, some of which cover a portion of the tuition costs for students in formal training programs. An application to the program also serves as an application for a tuition scholarship. Whenever possible, students will be notified about the scholarship at the same time they receive their admission decision. Full-time students have preference for tuition scholarships, although part-time students can request a scholarship.

All entering full-time CPTS graduate students receive a laptop computer with wireless capacity and standard software. The computer also will include SAS statistical software with a license active through the first semester. Students are responsible for renewing their SAS license thereafter. Students involved in formal training programs typically can have their program pay for this license. Students who are not in a formal training program for whom the license fee presents a financial burden should contact the CPTS Program Coordinator to discuss options for renewing the license. Part-time students and auditors will need to make their own arrangements for a computer and necessary software; a laptop is preferred given the need to access the internet and complete statistical analyses and other activities during class sessions.

All students are responsible for covering their living expenses through employment, formal training programs, financial aid, or other means. This includes required health insurance. A common health insurance plan and support toward its premium will be provided by the Graduate School for students who do not have access to insurance. Students also may be asked to undergo a physical examination at Employee Health and submit required documentation.

INTERNATIONAL STUDENTS

Applications from international students are accepted. Admitted students are responsible for obtaining the necessary visas and following all other regulations and policies. Students also must demonstrate that they have sufficient funds to support

themselves while in the United States. Assistance with visa issues can be obtained from the Registrar of the Graduate School, Bowman Gray Campus (Ms. Susan Pierce (spierce@wakehealth.edu). The WFU Center for International Studies provides information about regulations, housing, and local services; please see http://cis.wfu.edu/international-students-scholars/.

PROGRAM REQUIREMENTS AND RELATED INFORMATION

All prospective students should consult the Bulletin of the Wake Forest University Graduate School for official policies and procedures of the Graduate School, available at: http://graduate.wfu.edu/bulletin.html. The following degree requirements pertain specifically to the CPTS Graduate Program. Please note there is no certificate option in the CPTS Program.

MS PROGRAM

For students pursing the MS, alone or in combination with another degree, typically requires a minimum of two full-time years (one each for coursework and thesis preparation). Part-time status to extend coursework over more than one year requires the prior approval of the CPTS Program Directors. The degree must be completed within three years of matriculation, with the possibility of a maximum of two one-year extensions (see below for details). Coursework must include a minimum of 30 semester hours of graduate credit, with no more than six hours of thesis research credits.

JOINT MD/MS DEGREE PROGRAM

Students pursuing an MD degree at the Wake Forest University School of Medicine can incorporate the CPTS MS into their medical training. Students typically finish the first two years of medical school and then matriculate in the MS degree program, after which they return to conclude their final two years of medical school.

FACULTY ADVISING

Advising involves both the Program Directors and faculty advisors. During the first year of study, students will work with the Program Directors to identify a faculty advisor in the student's area of interest. Ideally this advisor would also serve as the student's thesis committee chair, so students and their faculty advisors are encouraged to meet occasionally during the coursework year. Program Directors are available to students and their advisors as needed.

COURSEWORK

The program is designed for full-time students, although students may receive approval from the Program Directors to pursue their degree on a part-time basis. Full-time students complete their course work in three semesters in the first year, with the second year devoted to completing the thesis. The Graduate School determines the Academic Calendar, found at http://graduate.wfu.edu/bulletin.html. During fall and spring terms, students should plan to spend the entirety of each Tuesday and Thursday in class. The summer course meets on Tuesday and/or Thursday morning. Courses are held at the Wachovia Building at 100 North Main Street in downtown Winston-Salem, NC. Nearby parking is available; details will be provided at the time of matriculation.

The course sequence for the first year of the CPTS program appears in Table 1 below. Course registration is handled by the Graduate School.

Table 1: CPTS Coursework

Fall (11 hours)	Spring (12 hours)	Summer (6 hours)
Epidemiology (CPTS 720, 4 hours)	Clinical Trial Methods (CPTS 742, 3 hours)	
Introduction to Statistics (CPTS 730, 4 hours)	Applied Linear Models (CPTS 732, 4 hours)	Research Grant Preparation (CPTS 741, 3 hours)
Conceptual Foundations of Community and Health Services Research (CPTS 748, 2 hours)	Research Design and Measurement Methods for Community and Health Services Research (CPTS 749, 4 hours)	Individual Study in Clinical and Population Translational Science (CPTS 766, 3 hours)
Ethics and Responsibility in CPTS I (CPTS 703, 1 hour)	Ethics and Responsibility in CPTS II (CPTS 704, 1 hour)	

Effective in the fall term of 2012, the CPTS Program will no longer offer what had been known as a genetics track.

Students who wish to pursue individualized study in area of particular interest to them may arrange with a CPTS faculty member to do so for credit through an elective course.

A student may petition the Program Directors for exemption from a required course if a similar course has previously been completed in the past. The student must provide a syllabus from the course and the final grade must appear on a transcript submitted as part of the Graduate School application. Alternatively, the student may be allowed to prove competency in the subject matter by completing the final examination from the most recent semester. All requests will be reviewed on a case-by-case basis.

In addition to the required coursework, students are encouraged to attend and participate in seminars, journal clubs, and similar events sponsored by the Division of Public Health Sciences, Translational Science Institute, and their home department. Such attendance typically does not receive academic credit, although attendance could be incorporated into a for-credit course of individual study arranged by the student with a CPTS faculty member.

PROGRESS IN COURSEWORK AND ADMISSION TO DEGREE CANDIDACY

Satisfactory progress in course work requires that students maintain a “B” average or higher, equal to a 3.0 on a 4.0 scale. Students' performance will be reviewed each semester by the Program Directors.

ADMISSION TO AND MAINTENANCE OF DEGREE CANDIDACY

After completing all required coursework, and prior to beginning their thesis, students must be admitted to degree candidacy by the Dean of the Graduate School. The application for candidacy is automatically submitted by the CPTS Program Directors and Coordinator after they receive the summer semester grade reports. This typically occurs in late August. Students do not need to initiate or participate in this process.

Upon admission to degree candidacy, students must be continuously enrolled until they graduate. Enrollment is achieved by registering for courses, research hours, or as “Thesis Only.” Nearly all CPTS students enroll as “Thesis Only.” Student receive enrollment reminders from both the Graduate School and CPTS Program. Enrollment fees are the responsibility of the student or their training program or department. Failure to maintain enrollment will result in students being administratively withdrawn from the CPTS Program and they will not be able to complete their degree requirements.

THESIS COMMITTEE FORMATION AND FUNCTION

After being admitted to degree candidacy, a Thesis Committee must be formed to advise each student on their thesis. The student’s faculty advisor and the CPTS Program Directors will assist the student in identifying committee members and obtaining their commitment to serve. The Thesis Committee is made up of the faculty advisor, who will serve as the thesis committee chair, a statistician, and one to two other faculty members. For clinically trained students, the Committee would ideally include a faculty member with substantial research experience. For non-clinically trained students, the Committee would ideally include a faculty member with relevant clinical expertise. Students must notify the Program Directors of their committee membership by completing and returning the Approval of Thesis Committee for CPTS Program form. This form is available at: http://www.phs.wfubmc.edu/public/cptsthesis.cfm. Signatures

of committee members are required to document their agreement and willingness to serve. Students should form a committee and notify the Program Directors as soon as soon as possible after coursework is completed, and well in advance of seeking approval of a thesis proposal.

Thesis Committee members must be members of the Graduate School Faculty. Please note that members of the Medical School Faculty are not automatically members of the Graduate School Faculty. Arrangements for cross-appointments are straightforward but can take several weeks to process. When they file their Approval of Thesis Committee form, students and the Program Coordinator should verify the appropriate appointments are in place or arrangements underway. Graduate Faculty are listed at: http://graduate.wfu.edu/faculty/directory.html.

In addition to meeting to approve the thesis proposal and again for the thesis defense, the student should meet regularly with the faculty advisor and as needed with other committee members to ensure the student makes steady progress toward thesis completion. The student, faculty advisor, or any committee member can initiate a request for a meeting if they feel there is a need to discuss issues in person. If the student, faculty advisor, or any committee member has questions or concerns about their role and responsibilities, or the function of the committee, they should contact one of the CPTS Program Directors.

SELECTION OF THESIS TOPIC

An important goal of the CPTS Program is that thesis research serves directly to advance the scientific and professional careers of the students. Students should therefore choose a topic that will further their career objectives and be publishable in their major field of interest. The thesis topic may require primary data collection or rely on secondary data analysis from an ongoing or completed study or another source of existing data. The thesis topic must constitute a new piece of work for the student; work completed prior to enrollment or during CPTS coursework is not acceptable. Students should work closely with their faculty advisors to select their thesis topic.

APPROACH TO AND FUNDING FOR THE THESIS

The thesis represents the culmination of the students' graduate training and thus students are expected to complete their theses independently, albeit with the advice and support of their thesis committee. Students are responsible for all written drafts and revisions, and should complete their own statistical analyses. Advisors may provide substantial feedback and sample statistical programs but may not write portions of the thesis nor conduct analyses for the student.

Thesis preparation costs generally are borne by the student and their department, training program, and thesis committee members' intramural or extramural research

support. Extremely limited funds to assist with thesis preparation costs are available through the CPTS Program; contact one of the Program Directors to explore this option.

THESIS PROPOSAL AND APPROVAL

Each student must prepare a thesis proposal and have it approved by their thesis committee and the CPTS Program Directors. The proposal should be submitted prior to the pursuing any statistical analyses, months prior to an intended defense date. The thesis proposal consists of three elements:

1. A literature review demonstrating the student has sufficient background knowledge to pursue the proposed work and can use this knowledge to craft a rationale for the proposed specific aims. The literature review also will form the basis for the first chapter of the written thesis.

2. A statement of specific aims for the proposed work. The aims should address an important question in clinical or population translational sciences and should be feasible within the scope of a thesis. This generally means a single outcome and single multivariable model approach, with one to three predictors of interest and several co-variables that may be confounders or effect modifiers. Multiple outcomes and model types fall outside the scope of a thesis.

3. A set of skeleton ("mock") tables and/or figures that will serve as the basis for the analysis and presentation of results. A brief written description of the proposed analysis may also be included.

There are no page requirements or limitations for the thesis proposal. A typical proposal includes 10 to 15 double-spaced pages of literature review; 1 to 2 pages outlining the specific aims; and approximately 5 to 10 pages of skeleton tables.

Immediately after the Thesis Committee approves the thesis proposal, the student should submit a completed Approval of Thesis Proposal form, available at: http://www.phs.wfubmc.edu/public/cptsthesis.cfm. This form and the approved proposal should be forwarded to the CPTS Program Coordinator. The CPTS Program Directors will review the proposal then contact the student and advisor to indicate full approval, approval with modifications requested, or disapproval with resubmission required. Statistical analyses and other work on the thesis may not proceed until the thesis proposal is approved.

THESIS COMPONENTS

Students are encouraged to approach their thesis as an expanded manuscript, which facilitates submission of their work for publication. This preferred approach requires a three chapter thesis. The first chapter includes a detailed literature review that builds on

the literature review presented as part of the thesis proposal. The second chapter takes the form of a single journal article with the student as first author; submission should only occur after the thesis defense. The third chapter contains ancillary analyses and an expanded discussion that often includes suggestions about future research to address remaining questions. While students may be encouraged to prepare additional journal articles for publication, they should not be included in full in the thesis.

Students have the option to complete a traditional thesis. This would include four chapters: Introduction, Methods, Results, and Discussion. While the Introduction would be comparable to the first chapter of the preferred approach, the other chapters would be expanded versions of chapters two and three of the preferred approach. Submitting a manuscript from a traditional thesis typically requires substantial additional revisions after completion of the thesis; therefore, this approach is not encouraged.

Either form of thesis should open with a title page, acknowledgements, table of contents, and abstract. In addition, the final section should include appendices and the student's curriculum vita. Appendices would include any material relevant to the thesis, such as questionnaires or a data dictionary.

THESIS FORMAT

The most important principles of thesis formatting are that the document be neat, error free, and consistently and clearly organized. Detailed guidelines are available at: http://graduate.wfu.edu/students/documents/Theses_Dissertations_instructions.pdf. In addition, in the weeks before their defense, each student meets with the Graduate School Registrar to review the format of their thesis. Students approaching the thesis as an expanded manuscript should include the chapters mentioned above rather than the traditional chapters mentioned in the Graduate School guidelines. For both thesis approaches, each chapter should include a bibliography at the conclusion of the chapter rather than a cumulative bibliography.

FINAL EXAMINATION AND EXAMINING COMMITTEE

The final examination for the master’s degree is an oral defense of the student’s thesis project. Details on the defense follow; students are encouraged to review this information carefully and completely.

The Examining Committee overlaps with but differs from the aforementioned Thesis Committee. The Examining Committee consists of at least three members of the WFU Graduate Faculty. The first member is the Examining Committee Chair, a Graduate Faculty member with relevant topical knowledge who has not worked with the student on their thesis. The remaining Examining Committee members are drawn from the Thesis Committee. When possible, all members of the Thesis Committee are included. If scheduling or other considerations prevent this, the thesis advisor and statistician are

given preference and serve on the Examining Committee. The Chair and all other Examining Committee members are appointed by the Dean of the Graduate School upon recommendation by the CPTS Program Directors. The Program Directors may or may not solicit input from the student and/or thesis advisor prior to making Examining Committee recommendations.

Examining Committee Members should receive the written thesis no less than three weeks prior to the defense. The Examining Committee Chair polls other Committee Members about the written thesis 10 days prior to the defense. Based on their assessment of the written thesis, Committee Members are asked to indicate whether they feel the student is prepared to successfully defend the work. If the Committee has major concerns, the defense can and should be rescheduled until their concerns are addressed.

The defense opens with an approximately 30 minute presentation of the thesis work by the student. This presentation is an expanded version of a scientific talk at a meeting, allowing the student to demonstrate more in-depth mastery of the background, methods, analysis and conclusions. While only material in the written thesis draft should be presented, it generally is not possible to present the entirety of the thesis. Students are encouraged to seek their faculty advisors' guidance when preparing this presentation.

The student presentation is followed by about 45 minutes of questioning by the Examining Committee. In addition to questions about the presentation and written thesis, relevant questions from CPTS coursework or clinical or other training can also be posed. The approach to this portion of the defense is highly variable. Sometimes Committees function in a round-robin manner in which each member asks a single question in turn. Others allow each member to ask all their questions then move on to the next member. Some Committees have a more free-flowing approach. The Examining Committee Chair oversees this portion of the defense and is charged with: (1) ensuring the questions are appropriate in terms of content; (2) that the discussion proceeds in a collegial manner; and (3) that all Committee Members have an opportunity to pose questions.

The Committee then deliberates in private after which they meet with the defending student to present their decision. The Examining Committee Chair is responsible for ensuring these deliberations are conducted in a fair and respectful manner. The decision options are: (1) pass with no revisions; (2) pass with minor revisions; (3) pass with major revisions; and (4) fail. Decisions 2 and 3 are by far the most common. The Committee also determines whether revisions require full Committee review or can be approved by the faculty advisor. In the event a student fails, a single re-examination is allowed.

Scheduling of the examination is handled by the CPTS Program Coordinator; neither students nor any of their advisors may schedule the final examination.

Each student and their Examining Committee Chair must be physically present at the defense. If a student has left the area prior to their defense, they must, at their own cost, make arrangements to return to Winston-Salem for the defense. Although to be avoided, other members of the Examining Committee can participate remotely, preferably through videoconferencing.

THESIS COMPLETION POLICY

For the CPTS program, the thesis represents a capstone experience in which students demonstrate the competencies they have acquired during their time in the program. The opportunity to prepare and hopefully publish a first authored manuscript from their thesis also provides students an entrée to their independent research career.

To maximize students' success with their thesis and retention of competencies developed during the program requires steady progress toward thesis completion, as newly-acquired knowledge and skills may diminish as thesis work is delayed. More importantly, delays prevent students from moving on to more independent work and may limit their ability to compete for extramural career awards and research funding. Finally, providing thesis mentoring represents a substantial and rarely compensated commitment for our faculty; thesis delays can make these commitments unduly burdensome.

Bearing in mind these important considerations, the CPTS program requires that:

1. Students who have completed their coursework must demonstrate progress on their thesis each semester. Progress will be assessed for all thesis only students at the end of each fall and spring semester, via a brief survey of each student and their thesis advisor. The CPTS Program Directors will review the responses and provide each student and their advisor with confirmation of acceptable progress or notification of concerns. Students with concerns raised in two consecutive semesters will be asked to provide an advisor-endorsed plan for completing their thesis within one year. This policy applies to all students in any status in the CPTS and predecessor programs housed within the Division of Public Health Sciences.

2. Students must complete their thesis within two years of finishing their coursework, with an option to request no more than two one-year extensions from the CPTS Program Co-Directors. The relevant form can be found at: http://www.phs.wfubmc.edu/public/cptsthesis.cfm. Thus the absolute maximum time allowed to thesis completion will be four years after coursework is completed. The Graduate School policy of six years from matriculation does not apply. Acceptable reasons for an extension will vary and may include delays in acquiring desired data or departure of a thesis mentor from the faculty. Moving on to another training program or permanent position generally will not be considered an acceptable reason for an extension to be granted. Extensions must be requested before the end of the semester in which the student otherwise would be required to complete their thesis. This policy applies to students who matriculated in the CPTS Program

as of the fall semester in 2009 (not to students in predecessor programs housed within the Division of Public Health Sciences).

ADDITIONAL THESIS INFORMATION

Students will be required to attend an orientation to the thesis process at the end of their first year. The CPTS Program has a web page devoted to thesis-related topics, at: http://www.phs.wfubmc.edu/public/cptsthesis.cfm. This page includes a presentation reviewing the key steps in the thesis process and providing strategic suggestions, as well as both a broad and more detailed timeline.

GRADUATE SCHOOL OPPORTUNITIES

The Graduate School supports a number of events and provides opportunities for professional development. This includes a Graduate Student Association and a research day at which students compete for prizes, as well as travel awards to support presentation of results at professional meetings. Students are encouraged to make full use of these resources.

ETHICAL CODE OF CONDUCT

All students are required to adhere to the highest ethical standards in completing their coursework and thesis. Student misconduct will not be tolerated, and may lead to the expulsion of the student from the CPTS Program. Misconduct includes but is not limited to: cheating on exams or other course work; stealing school and/or other students' property; vandalism; plagiarism and/or failure to cite/credit other professionals for their published work; falsifying data; computer misuse as specified by WFU; or failure to report an honor code violation by another student to the WFU Graduate School or CPTS Program Director(s). Suspected ethical misconduct will be referred to the CPTS Program Director(s) for investigation.

COURSE DESCRIPTIONS

The typical schedule and sequence of courses for the Program is shown above. Students who wish to audit or take a course for credit in our Program must either be enrolled in another WFU graduate program or receive special student status from the Graduate School. Students must meet course prerequisites and receive approval to register. When CPTS courses are oversubscribed, priority will be given to full-time students whose program requires the course; auditors will be the lowest priority. Neither a tuition scholarship nor laptop computer will be available to auditors. Auditors are welcome to attend lectures but should not expect to participate fully in course activities or have assignments evaluated.

CPTS 703 and 704, *Ethics and Responsibility in CPTS I and II*, 1 hour each: This two course sequence covers professional ethics and responsibility for students in the CPTS program. The courses pursue three main objectives: (1) to introduce students to the culture, people and norms of biomedical research in the United States, (2) to identify points of ethical and/or professional conflict and tension in the research world, i.e. moments where incorrect decisions are at risk of being made, (3) to help students develop ethical reasoning skills and a strategy for making appropriate, responsible decisions that are consistent with a high commitment to professionalism and social responsibility. Students will also be required to complete the Collaborative Institutional Training Initiative (CITI) Human Research On-Line Curriculum as part of this course.

CPTS 720, *Epidemiology*, 4 hours: The course will provide students with a foundation in the history, concepts, and methods of epidemiology. Topics include measurement of exposure and disease, prevalence, incidence, association, and sensitivity/specificity analyses. Measurement error, bias, confounding, effect modification, causality and policy implications are discussed. The following observational study designs are reviewed: cross-sectional, case-comparison, cohort, ecological and meta-analysis. Includes a weekly one hour problem-solving laboratory.

CPTS 730, *Introduction to Statistics*, 4 hours: The course is an introduction to statistical concepts and basic methodologies that are prevalent in biomedical literature. It includes discussion of such topics as descriptive statistics, probability, sampling distributions, hypothesis testing, simple linear regression, correlation, one-way analysis of variance, categorical data analysis, survival analysis, sample size and power analysis, and nonparametric methods.

CPTS 732, *Applied Linear Models*, 4 hours: The topics of the course include statistical concepts and basic methodologies related to the general linear model and its extensions. The basic statistical procedures discussed in the course include simple and multiple linear regression, analysis of variance and covariance, logistic regression, and repeated measures analysis. Emphasis is given to proper application and interpretation of statistical methods and results. Prerequisite = CPTS 730, Introduction to Statistics.

CTPS 741, *Research Grant Preparation*, 3 hours: This course is designed to provide students with the knowledge and skills to develop grant proposals to pursue funding in their areas of interest. Topics covered include: the role of external funding in biomedical research; how to identify public and private sources of funding; required components in any type of grant submission; and human subjects and budgeting considerations. During the course, students develop a research proposal for peer review and critical discussion.

CPTS 742, *Clinical Trial Methods*, 3 hours: This course will provide students with detailed knowledge of clinical trials methodology from Phase I through Phase IV Trials and beyond. Topics to be covered include: why trials are needed; specification of the trial question(s); basic trial designs; identification of the appropriate study population, interventions, and response variables (including morbidity, mortality and patient-oriented outcomes); the randomization process; masking; sample size issues; issues in data

analysis; recruitment/retention/adherence issues; trial monitoring and interim analyses, assessing/reporting adverse effects; interpreting trial results; meta-analyses; and post-marketing surveillance.

CPTS 748, *Conceptual Foundations of Community and Health Services Research*, 2 hours: Successful translation of research into practice takes place in community and health delivery settings, which present unique opportunities and challenges to translational scientists. After an introduction to research in these settings, the course will focus on the development of integrated aims, literature reviews, and conceptual frameworks that provide the necessary foundation for successful community and health delivery translational research. To provide students with the opportunity to expand their ability to develop and communicate research concepts, the course will include numerous in-class activities and several written assignments.

CPTS 749, *Research Design and Measurement Methods for Community and Health Services Research*, 4 hours: The opportunities and challenges of translational research in community and health delivery settings require scientists to make informed, strategic choices regarding study designs and methods that will ensure their research questions are answered appropriately. After beginning with an introduction to study designs unique to these settings, the course explores how designs are selected and examines specific application of these designs within the community and health delivery settings. The latter part of the course focuses on measurement, with emphasis on the development of data collection forms and surveys. To provide students with the opportunity to expand their ability to develop and communicate research concepts, the course will include in-class activities plus a presentation and written assignments.

CPTS 750, *Thesis Research*, 1 to 6 hours: Research directed towards the thesis. May be repeated for credit.

CPTS 766, *Individual Study in Clinical and Population Translational Science*, 1 to 4 hours: This offering will provide students with opportunities to pursue advanced topics in their individualized areas of interest with guidance from expert faculty. Potential examples of content areas include, but are not limited to, bioethics, cancer, cardiovascular disease, infectious disease, group randomized trials, qualitative methods, psychometrics, economic analysis, nutritional epidemiology and nutrigenomics, pharmacoepidemiology and pharmacogenomics. Individual studies may also be arranged to provide bench, community or health services research “lab” time for a student interested in translation of knowledge between settings (lab, clinic, healthcare delivery system and community). May be repeated for credit. Permission of instructor required for all students.

PROGRAM LEADERSHIP AND FACULTY

Faculty from Public Health Sciences teach most of the courses in the CPTS program and also serve on thesis committees. Other Graduate School Faculty may serve as instructors or thesis committee members after consultation with the CPTS program co-directors. Faculty who are not currently appointed to the Graduate School will need to work with the CPTS program co-directors to arrange a permanent or temporary appointment before serving on a thesis committee.

Program Co-Directors

BYINGTON, ROBERT, Public Health Sciences/Epidemiology and Prevention (BS, Loyola College; MPH, University of Texas School of Public Health; PhD, University of Texas School of Public Health).

GEIGER, ANN M., Public Health Sciences/Social Sciences and Health Policy (AB, Harvard-Radcliffe College; MPH, University of Michigan School of Public Health; PhD, University of Michigan Rackham Graduate School).

Program Coordinator

BEANE, JOAN, Public Health Sciences/Social Sciences and Health Policy

Executive Committee

ARCURY, THOMAS, Family & Community Medicine (BA, Duquesne University; MA, University of Kentucky; PhD, University of Kentucky).

BISCHOFF, WERNER, Infectious Diseases (MA, MD, Medical School Georg-August-University; MS, Wake Forest University School of Medicine; PhD, University of North Carolina at Chapel Hill).

GOFF, DAVID C., Public Health Sciences/Epidemiology & Prevention (BS, Duke University; MD, University of North Carolina Medical School; PhD, University of Texas-Houston School of Public Health).

HAYASAKA, SATORU, Public Health Sciences/Biostatistical Sciences (BSc, Concordia University; MS, The University of Michigan; PhD, The University of Michigan).

KEMPER, KATHI, Pediatrics (BA, University of Chicago; MD, University of North Carolina at Chapel Hill; MPH, University of North Carolina at Chapel Hill).

LENG, IRIS, Public Health Sciences/Biostatistical Sciences (MD, Beijing Medical University; MS (Public Health), Beijing Medical University; MS (Statistics), University of California, Davis; PhD, University of California, Davis).

NICKLAS, BARB, Internal Medicine/Gerontology and Geriatric Medicine (BSE, N.E. Missouri State University; MS, Iowa State University; PhD, University of Maryland).

RHODES, SCOTT, Public Health Sciences/Social Sciences and Health Policy (BA, College of William & Mary; MPH, University of South Carolina School of Public Health; PhD, University of Alabama School of Public Health).

VITOLINS, MARA, Public Health Sciences/Epidemiology and Prevention (BA, Albertson College of Idaho; MPH, Loma Linda University; DrPH, Loma Linda University).