

# CLINICAL AND TRANSLATIONAL SCIENCES

<b>Graduate Program Head</b>	James Pawelczyk
<b>Program Code</b>	CTS
<b>Campus(es)</b>	Hershey University Park
<b>Degrees Conferred</b>	Dual-Title
<b>The Graduate Faculty</b>	<a href="https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=CTS">View (<a href="https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=CTS">https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=CTS</a>)</a>

Students electing to pursue this program through participating departments will earn a degree with a dual-title at the Ph.D. level, i.e., Ph.D. in [major program name] and Clinical and Translational Sciences.

The following graduate programs offer a dual-title degree in Clinical and Translational Sciences: Anatomy, Biobehavioral Health, Biomedical Sciences, Food Science, Human Development and Family Studies, Kinesiology, Neuroscience, Nursing, Nutritional Sciences, Pathobiology.

The College of Medicine provides academic leadership of the CTS dual-title graduate degree program. It is administered jointly on the University Park and Hershey campuses through the College of Health and Human Development and the College of Medicine, respectively, in conjunction with Penn State's Clinical and Translational Science Institute (CTSI) and in coordination with the student's primary graduate program. The CTS Education Committee maintains the program's definition and goals, identifies faculty and courses relevant to the CTS dual-title graduate program, and recommends policies and procedures for the program's operation.

The dual-title graduate degree program in CTS is designed to provide students with the aptitudes and skills necessary to expand research in their major field of study to impact clinical medicine and public health. The dual-title graduate degree program will provide opportunities to synthesize expertise across disciplinary boundaries and to evaluate the effectiveness of research to create improved clinical and/or health outcomes. This program enhances training in the major field of study by providing value-added skill sets in patient-oriented, epidemiological, behavioral, and outcomes and health services research that transition scientific findings from the laboratory to the clinical setting to best practices in the community. Clinical and translational sciences are expanding, with career paths in academic, medical and industrial settings.

Because the dual-title Ph.D. complements the primary program of study, CTS program representation must be included at all phases of graduate study, including the qualifying exam, Ph.D. committee, comprehensive exam, and final oral examination (dissertation defense).

## Admission Requirements

Requirements listed here are in addition to requirements listed in GCAC-208 Dual-Title Graduate Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-208-dual-titles/>).

Students must apply and be admitted to their primary graduate program and The Graduate School before they can apply for admission to the CTS dual-title degree program. After admission to their primary

program, students must apply for admission to and meet the admissions requirements of the CTS dual-title program. Doctoral students must be admitted into the dual-title degree program in CTS prior to taking the qualifying examination in their primary graduate program.

An admissions committee comprised of faculty affiliated with the CTS dual-title graduate degree program will evaluate students. Applicants must have a graduate GPA of at least 3.5 in an area that relates to clinical and translational sciences. Applicants will be required to provide a statement of purpose that addresses the ways their research and professional goals will be enhanced by interdisciplinary research.

## Degree Requirements

Requirements listed here are in addition to requirements listed in GCAC-208 Dual-Title Graduate Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-208-dual-titles/>).

To qualify for a dual-title degree, students must satisfy the requirements of the primary graduate program in which they are enrolled. In addition, they must satisfy the degree requirements for the dual-title in CTS listed below.

General requirements for the dual-title Ph.D. in [major program name] and Clinical and Translational Sciences are listed below:

Code	Title	Credits
<b>Required Courses</b>		
CTS 590	Colloquium (two semesters)	2
Select 6 credits from the following:		6
CTS 595A	Clinical Science Internship	
CTS 595B	Translational Science Internship	
BMS 571	Graduate Clinical Rotation	
<b>Electives</b>		
18 additional credits from a list of approved electives in the following areas: <sup>1</sup>		
Statistics		3
Epidemiology		3
Bioinformatics		3
Experimental design and interpretation		3
The regulatory environment		3
Scientific communication		3
<b>Total Credits</b>		<b>26</b>

<sup>1</sup> The choice of CTS electives may be proposed by the student, subject to approval by the student's academic advisers from the primary and CTS programs. They should complement the student's work in the primary program. A list of approved electives (<https://sites.psu.edu/ctsprogram/current-students/elective-course-list/>) is available on the CTS program home page.

- Successful completion of qualifying and comprehensive examinations in clinical and translational sciences and the related field. The specific format and content is determined in consultation with the primary program.
- Successful defense of a dissertation in the major field with a substantial component that is clinical or translational in nature.

- Scholarship and Research Integrity (SARI) training (required of all Penn State graduate students)
- Institutional Review Board and/or Institutional Animal Care and Use Committee training (as appropriate)

### **Qualifying Examination**

Typically, students will be accepted to the dual-title during their first year of study. In some circumstances students may be considered during the second year. To be admitted to the CTS dual-title graduate degree program students must meet the Ph.D. qualifying examination requirements in both their major area of study and the dual-title area. The qualifying exam will include both elements. Dual-title graduate degree students may require an additional semester to fulfill requirements for both areas of study and, therefore, the qualifying examination may be delayed one semester beyond the normal period allowable.

The qualifying examination committee for the dual-title Ph.D. degree must include at least one Graduate Faculty member from the CTS program. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role.

### **Ph.D. committee Composition**

In addition to the general Graduate Council requirements for Ph.D. committees (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/phd-dissertation-committee-formation/>), the Ph.D. committee of a CTS dual-title doctoral degree student must include at least one member of the CTS Graduate Faculty. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role. If the chair of the Ph.D. committee is not also a member of the Graduate Faculty in CTS, the member of the committee representing CTS must be appointed as co-chair.

### **Comprehensive Exam**

The CTS representative on the student's Ph.D. committee will develop questions for and participate in the evaluation of the comprehensive examination. The comprehensive exam will require the student to demonstrate an understanding of the methods of translational sciences and an ability to apply them to problems in the student's major field of study. When appropriate, the student will be expected to demonstrate a working knowledge of methods to evaluate and compare the outcomes of his/her research to related approaches already in existence.

### **Dissertation**

Students in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their Ph.D. committee and reflects their original research and education in both their primary graduate program and CTS. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

## **Minor**

A graduate minor is available in any approved graduate major or dual-title program. The default requirements for a graduate minor are stated in Graduate Council policies listed under GCAC-600 Research Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>) and GCAC-700 Professional Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>), depending on the type of degree the student is pursuing:

- GCAC-611 Minor - Research Doctorate (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-611-minor-research-doctorate/>)
- GCAC-641 Minor - Research Master's (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-641-minor-research-masters/>)
- GCAC-709 Minor - Professional Doctorate (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-709-professional-doctoral-minor/>)
- GCAC-741 Minor - Professional Master's (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-700/gcac-741-masters-minor-professional/>)

## **Student Aid**

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (<https://gradschool.psu.edu/graduate-funding/>) section of The Graduate School's website. Students on graduate assistantships must adhere to the course load limits (<https://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants/>) set by The Graduate School.

## **Courses**

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Clinical and Translational Sciences (CTS) Course List (<https://bulletins.psu.edu/university-course-descriptions/graduate/cts/>)

## **Learning Outcomes**

1. **Know:** Students will demonstrate knowledge of the core concepts of clinical and translational science, including an understanding of study design, methods, results, and significance in their major program area, integrating this comprehension/understanding in a translational context, and relating it to problems in biology, medicine, and public health.
2. **Apply/Create:** Students will be able to synthesize the research findings in their specialty area and generate ideas for a novel research project that includes one or more translational elements. They will be able to articulate the rationale for the proposed research project, clearly describe a specific hypothesis to be tested, apply best-practices in research design, test the hypothesis and complete the project successfully.
3. **Communicate:** Students will be able to convey ideas or arguments in clear, concise, well-organized papers and proposals as well as in formal, oral presentations. They will be able to discuss clinical and translational research findings with scientists from diverse disciplines, health professionals, and the lay public.
4. **Critical thinking:** Students will master the ability to critique the primary literature in their major program area and place it in a translational context. They will successfully identify research questions, experimental design and conclusions in scientific articles in the field. They will be able to recognize and summarize the strengths and weaknesses of relevant literature from multiple disciplines and to apply their knowledge of bioinformatics,

epidemiology, statistics and experimental design to critique methodology and conclusions.

5. **Professional practice:** Students will demonstrate knowledge and comprehension of research integrity which are relevant to the field of clinical and translational science, including working with animals, humans, and communities; ethical principles related to authorship; plagiarism; and conflicts of interest. They will be able to work effectively in multidisciplinary teams. They will expand their understanding of the profession through internship(s) and contribute to the profession through service.

## Contact

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**Program Website** View (<http://sites.psu.edu/ctsprogram/>)

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