University of Pittsburgh | School of Pharmacy

Area of Concentration in Research (ARCO-RES) in the Doctor of Pharmacy (PharmD) Program

Purpose

The purpose of the Area of Concentration in Research (ARCO-RES) in the University of Pittsburgh School of Pharmacy Doctor of Pharmacy (PharmD) program is to provide students exposure to research fundamentals, cultivate an appreciation for clinical and translational research, and to help position students as highly competitive candidates for formal post-PharmD research education and training.

Description

Specialized training associated with current Doctor of Pharmacy programs affords pharmacists the opportunity to make unique contributions to clinical and translational research. As the premiere drug therapy specialist, a pharmacist with appropriate research training and experience can have a major impact on our understanding of drug therapies and mechanisms associated with human disease. The goal of the ARCO-RES is to introduce PharmD students to the basic elements of research, and in particular clinical and translational research. This pathway is not intended to prepare independent researchers, but to help students appreciate the vast research opportunities available to them as pharmacists. Students who are intrigued by research, but have had no formal exposure, may find clinical and translational research to be a potentially enriching career path.

Students participating in the ARCO-RES enroll in graduate level courses offered by the School of Pharmacy. Faculty from the Departments of Pharmacy and Therapeutics and Pharmaceutical Sciences serve as research rotation advisors and graduate course instructors. The ARCO-RES does not require students to take additional credits, but rather is a way for students to concentrate their classroom-based and experiential-based electives in a selective way to meet the intent of the ARCO. As such, the credits satisfy requirements for both the ARCO-RES and the PharmD degree.

Students successfully completing the ARCO-RES pathway will receive special recognition at the School of Pharmacy graduation and a corresponding notation on their official academic transcripts. Those students interested in graduate education can receive advanced standing (credit for coursework completed) within the University of Pittsburgh School of Pharmacy Clinical Pharmaceutical Scientist Program. Alternatively, PharmD students may apply to the combined PharmD/PhD Program at the University of Pittsburgh School of Pharmacy.

Eligibility/Academic Standing

The ARCO-RES is available to all students currently enrolled in the PharmD curriculum and in good academic standing throughout the PharmD program. Preference for acceptance into the program will be given to students with a grade point average (GPA) of at least 3.0/4.0 in the PharmD curriculum. Once accepted, all students must remain in good academic standing in the PharmD curriculum. Those that fall out of good academic standing will be placed on probation in the ARCO- RES. Students who earn a grade of 'F' in any course may be administratively dismissed from the program. Reinstatement to the ARCO-RES will be made on a case-by-case basis by the coordinators and oversight committee.

Learning Outcomes: Foundational Knowledge, Skills and Attitudes

The low student/faculty ratio and tailored curriculum of the ARCO-RES offers a special opportunity for students to acquire an important skill set offered by the area of concentration. While new skills can be acquired throughout the School's curriculum, the ARCO-RES offers a more advanced exposure to critical research fundamentals in the pharmaceutical sciences.

Skills that students may acquire include the following:

Literature Review and Evaluation	• Describe the current state of knowledge of a biomedical, clinical, or public health problem.
Hypothesis Generation	• Recognize and explain the clinical and public health implications of a research hypothesis.
Research Design and Methods	• Recognize appropriate methods to recruit and retain study participants for a selected research design. • Identify important outcome measures for incorporation into patient-oriented clinical trial design.
Statistical Methods and Data Evaluation	• Select the appropriate statistical approach for the interpretation of preclinical and clinical datasets.
Ethical Conduct of Research	• Demonstrate knowledge of the standards of professional and ethical conduct established to guide researchers in protecting the rights, well-being, and dignity in recruitment and retainment of human subjects in clinical research.

Academic Requirements

The ARCO-RES pathway includes a sequence of approved elective didactic courses, two elective research rotations during the P4 year, and an approved project under the guidance of a research advisor. A minimum of 16 credit hours of coursework and rotations in the ARCO-RES pathway are required.

Coursework

Students must complete a minimum of six credits (maximum of 10 credits) of coursework in the ARCO-RES pathway, selected from the list of approved courses below comprised of classes offering letter grades or 'HSU'. These courses may be taken anytime during P1-P3 years. **However, please note that at least six credits of electives must be taken for letter grades (not 'HSU') during the P3 year.** Within the School of Pharmacy, several graduate level courses have been approved for inclusion in the concentration. Students may select any combination of available courses to fulfill the requirements.

Additional courses outside the School of Pharmacy may also be accepted on a case-by-case basis with prior approval of the oversight group and the course instructor.

Approved courses include the following:

<u>P1, P2 or P3 Year Courses</u>

- Computational Systems Pharmacology, PHARM 3068: 3 Cr (Fall, every other year)
- Pharmacometrics, PHARM 3069: 3 Cr (Fall, every other year)
- Topics in Pharmacokinetics/Pharmacodynamics Journal Club, PHARM 3072: 1 Cr (Fall/Spr)
- Mentored Research, PHARM 1097: 1-3 Cr (Fall/Spr/Sum)
- Special Topics, PHARM 5851-5858: 1-3 Cr (Fall/Spr/Sum)
- Research Practicum, PHARM 3042: 0-5 Cr (Fall/Spr/Sum)
- Intro to Regulatory Aspects of Drug Development, PHARM 3074: 1 Cr (Spr)

<u>P3 Year Courses</u>

- Pharmaceutical Analysis, PHARM 2001: 3 Cr (Spr)
- Pharmacoepidemiology, PHARM 2003: 2 Cr (Spr, every other year)
- Pharmaceutical Sciences Seminar, PHARM 3024/3025 (Fall/Spr): 1 Cr
- Topics in Translational Research, PHARM 3034: 1 Cr (Fall)
- Statistical Methods, PHARM 3040: 3 Cr (Fall)
- Pharmacy Innovations 5820/5821: 1 Cr (Fall/Spr)
- Python for Data Management & Analytics, PHARM 5834: 3 Cr (Spr)
- Advanced Pharmacokinetics, PHARM 3002: 4 Cr (Spr)

Experiential Rotations

All students in the Doctor of Pharmacy program must complete five required rotations and two elective rotations during the P4 year. Students participating in the ARCO-RES must complete their two elective rotations in a pre-approved research area. If a rotation is completed outside a traditional 'wet-lab', then the research focus (and project, if applicable) agreed upon by the student and preceptor must be submitted to and approved by the ARCO-RES oversight group.

Students are encouraged (not required) to pursue summer research experiences following the P1 and/or P2 years. Students who complete a **pre-approved** summer research experience are required to complete only one elective research rotation during the P4 year, however, the summer research experience **MUST BE PRE-APPROVED** by the ARCO Chair.

It important to note that the ARCO-RES rotations are not additional rotations; students will select from the list of approved research rotations that satisfy the requirements of both the ARCO-RES and the PharmD program. Students accepted for participation in the ARCO-RES will be given preferential placement in the research rotations within the School of Pharmacy. Approved research rotations are available with the following faculty members:

- Dr. Simone Brixius-Anderko
- Dr. Aaron Devanathan
- Dr. Kerry Empey
- Dr. Philip Empey
- Dr. Tanya Fabian
- Dr. Zhiwei Feng
- Dr. Christian Fernandez
- Dr. Carlo Iasella
- Dr. Velvet Journigan
- Dr. Song Li
- Dr. Xiaochao Ma
- Dr. Thomas Nolin
- Dr. Sravan Patel
- Dr. Lisa Rohan
- Dr. Imam Shaik
- Dr. Wen Xie
- Dr. Junmei Wang
- Dr. Wei Zhang

Students are encouraged to consult these faculty directly or the Director of Experiential Learning for information pertaining to individual rotations and guidance on which rotations to pursue. Research rotations may also be completed with faculty outside the School of Pharmacy on a case-by-case basis with **prior approval** of the faculty member and the ARCO coordinator.

Project

As part of the ARCO-RES, students must complete a project under the supervision of a faculty member. Once accepted into the ARCO-RES, students will meet with the ARCO-RES coordinator to discuss suitable project ideas and identify faculty mentors. Students may elect to work on the project during a P4 rotation or by enrolling in 'Mentored research' or a 'Special Topics' course; however completion of the project for credit is not necessary. Students should consult the School of Pharmacy Academic Records Manager for enrollment information for all research courses.

Alignment with the Advanced Standing PharmD/PhD Combined Program

If prospective students interested in the ARCO-RES are also interested in the University of Pittsburgh School of Pharmacy PharmD/PhD Program (https://www.pharmacy.pitt.edu/sites/default/files/assets/PharmD-PhD-Combined-Program.pdf), please reach out to the ARCO-RES Coordinator to discuss coordination of coursework, important timelines and deadlines, and expectations for students. This will ensure students effectively meet the requirements discussed within the programs.

Student Application Process

It is possible that student demand for participation in the ARCO-RES may exceed capacity; therefore students must apply for acceptance into the ARCO-RES. The application process requires the following (electronic submission is acceptable, where applicable):

- Letter of intent, including a discussion of the anticipated value of the ARCO to desired career
- Resume/CV
- Permission for the oversight group to review the student's academic transcript
- Interview with at least one member of the oversight group

Within the design of the Doctor of Pharmacy curriculum, classroom-based elective courses are taken in the P3 year, during which students are classified as Graduate students by the University. Students may apply to the ARCO-RES during their P1 or P2 years.

To facilitate selection of targeted courses and research rotations, the deadline for application submission will be January 15th of the P1 or P2 year (depending on which academic year in which the student applies). Decisions will be made and students notified prior to registration for the fall term of the P2 or P3 year.

When an ARCO program is not at full enrollment capacity following a given application period, the ARCO coordinator may elect, at a later date, to consider acceptance of students who come to career goals later in his/her academic career but are committed to the specific career path and who submit the required materials (see above). Acceptance is possible only if students can successfully achieve program requirements in the remaining academic periods.

Complete applications, including the student's academic performance to date, will be screened by a minimum of two members of the ARCO oversight group.

Members of the ARCO-RES oversight group are available to answer questions and discuss the ARCO-RES program. Contact information is provided below.

ARCO-GPC Oversight Group

Aaron S. Devanathan, PharmD, PhD, AAHIVP
(Coordinator)
Assistant Professor, Pharmacy & Therapeutics
208 Salk Pavilion
asd129@pitt.edu

Kerry M. Empey, PharmD, PhD
Associate Professor, Pharmacy & Therapeutics
207 Salk Pavilion
kme33@pitt.edu

Philip E. Empey, PharmD, PhD, FCCP
Associate Professor, Pharmacy & Therapeutics
205 Salk Pavilion
pempey@pitt.edu

Thomas D. Nolin, PharmD, PhD, FCCP, FCP, FASN
Associate Professor, Pharmacy & Therapeutics
206 Salk Pavilion
nolin@pitt.edu