

CORE COMPETENCIES OF GRADUATING BIOMEDICAL SCIENCE PHD STUDENTS

The Division of Biomedical Science Programs at Drexel University College of Medicine offers a diverse set of courses, seminars, workshops and various professional development events that are designed to support our students in areas of personal growth in conceptual and practical knowledge and professional development. By focusing on the development of a variety of transferable skills, students in the Division can prepare for positive career outcomes in both academic and non-academic career tracks.

Provided below is a list of desirable competencies for our graduating PhD students, each clustered under a common skill set that is designed to help students achieve these competencies. Each competency includes a definition, followed by a list of some observable behaviors that may be used as examples of competency.



I. DISCIPLINE-SPECIFIC CONCEPTUAL KNOWLEDGE

Graduating students should demonstrate a broad base of established and evolving knowledge within a chosen discipline and detailed knowledge of a specific research area. Students should understand the gaps, conflicts, limits, and challenges within their research area such that they can develop testable hypotheses. Examples of discipline-specific conceptual knowledge include:

- Proficiency in analytical approaches to defining scientific questions
- Design of scientifically testable hypotheses
- Broad based and cross-disciplinary knowledge acquisition
- Detailed knowledge of a specific research area

II. RESEARCH SKILL DEVELOPMENT

Graduating students should be able to design sound research protocols, safely perform the techniques necessary to conduct and analyze this research, and navigate the grant application and scientific publishing processes. Examples of research skill development include:

- Proficiency in experimental design and research techniques
- Proficiency in data analysis and interpretation
- Flexible and creative thinking and troubleshooting
- Proficiency in laboratory safety procedures and considerations
- Effective search strategies and critical evaluation of the literature
- Understanding grant application and scientific publishing processes

III. COMMUNICATION SKILLS

Graduating students should demonstrate interpersonal and other communication skills that enable them to communicate effectively with colleagues at all levels. Competencies in communication skills include the develop of effective writing, speaking, and listening skills as well as:

- Proficiency in the preparation of scientific publications and grant applications
- Proficiency in the preparation of curriculum vitae, resume, cover letters, and research and teaching statements
- An ability to present research to scientific and lay audiences
- Competency with processes involved in effective job interviews and job talks

IV. TEACHING SKILLS

Graduating students should develop and improve teaching skills through programs, workshops, and trainings aimed at developing classroom leaders. In the absence of actual teaching experience, students can also develop the student perspective on the classroom experience in the areas suggested below:

- Identifying learning outcomes and promoting critical thinking
- Assessing learning and teaching
- Designing courses and modules
- Effective use of technology for education
- Designing inclusive course environments

V. PROFESSIONALISM

Graduating students should fully understand the importance of adhering to accepted professional standards and practices within the workplace, institution, and discipline. Examples of areas of professionalism competency include:

- The ability to assess and uphold workplace etiquette
- Understanding and complying with rules, regulations, and institutional norms, including Title IX protections
- Respecting, evaluating, and enhancing the intellectual contributions of others
- Identifying and managing apparent and actual conflicts of interest, ethical violations, and violations of expected professional behavior

- Understanding how the discipline is advanced and promoted by public and professional service activities, such as promotion of public awareness of science by professional societies, editorial and advisory boards, peer review panels, and institutional committees
- Understanding how the discipline is advanced and promoted by partnerships with government agencies, foundations, and/or nonprofit organizations, such as funding agency grant panels or other advocacy/advisory boards to contribute to the advancement and promotion of the discipline

VI. LEADERSHIP AND MANAGEMENT SKILLS

Graduating students should understand how to facilitate effective team work to manage day-to-day operations within the workplace. To achieve competency in leadership and management skills, students are encouraged to pursue leadership opportunities at the local, institutional, regional, and (if applicable) national levels. Examples of additional competencies in leadership and management skills include:

- Understanding how to set expectations and goals
- Understanding how to build teams to weather adversity
- Understanding processes involved in negotiating and resolving conflict
- Giving and receiving feedback
- Valuing diversity
- Project management and budgeting
- Developing mentoring relationships
- Entrepreneurship
- Building reputation and esteem

VII. CAREER EXPLORATION

Graduating students should understand how to expand knowledge of various career paths to help career planning, both early and strategically. Examples of areas of proficiency in career exploration include:

- Networking
- Identifying skills, interests and values
- Researching employers
- Communicating your fit for a position
- Using Drexel's career resources
- Interviewing
- Writing resumes and cover letters

VIII. PERSONAL DEVELOPMENT

Students should develop skills that improve confidence and identity, strengthen personal resources, enhance the quality of life, and contribute to the realization of aspirations. Examples of areas to be addressed in personal development include:

- Seeking health and wellness and striving for work-life balance
- Developing positive thinking styles
- Being engaged in the community
- Overseeing personal finances
- Effective management of time and stress
- Resiliency

IX. RESPONSIBLE CONDUCT OF RESEARCH (RCR)

Students should receive training in responsible conduct of research to improve their ability to make ethical and legal choices. Topics covered in this training include:

- Understanding how to share data with collaborators, including industry-specific concerns as appropriate
- Practicing rigor, honesty, and integrity in experimental design, performance, and data analysis as well as how to report data with acceptable standards of reproducibility
- Understanding the rules for ownership and access to data and the criteria for authorship
- Understanding and respect for intellectual property rights, patents, and copyrights

- Understanding ethical principles and local, state, and federal regulations/guidelines for conducting human subjects research, including Institutional Review Board (IRB) processes and procedures
- Understanding requirements for reporting clinical trials
- Understanding how to account for the possible role of sex of a biological variable in vertebrate animal and human studies and why this is important
- Understanding ethical principles and local, state, and federal regulations/guidelines for use of animals in research as well as Institutional Animal Care and Use Committee (IACUC) processes and procedures
- Understanding applicable definitions and reporting procedures of misconduct (federal, ORI/PHS, NASA, NEH, NSF, etc.)
- Understanding personal, intellectual, and financial conflicts of interest
- Understanding confidentiality and bias in peer review
- Understanding the mentor and trainee relationship