

School of Graduate and Postdoctoral Studies

Graduate Student Core Competencies

Six Graduate Student Core Competencies:

1. Discipline-Specific Conceptual Knowledge

Graduate students are expected to demonstrate a broad base of established and evolving knowledge within their discipline and detailed knowledge of their specific research area. They should understand the gaps, conflicts, limits, and challenges within their research area such that they can develop testable hypotheses.

Delineation of Specific Skills

- Apply analytical approach to defining scientific questions
- Design scientifically testable hypotheses
- Express broad based and cross-disciplinary knowledge
- Restate detailed knowledge of specific research area

2. Research Skill Development

Graduate students are expected to be able to design sound research protocols, and safely perform the techniques necessary to conduct and analyze this research.

Delineation of Specific Skills

- Employ research techniques and laboratory safety
- Construct a careful experimental design
- Analyze and interpret data
- Use effective search strategies and critically evaluate the literature
- Plan long and short term priorities
- Manage time effectively
- Collect records in print and electronic media
- Use data backup protocols

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3. Communication Skills

In any professional environment, the ability to communicate one's thoughts in a way that people readily understand is critical. Although graduate students learn many communication skills throughout their educational lifespan, these skills take time to master. Communication is more than preparing and sending a message; it is making every effort to be sure that the message is heard and understood by the appropriate audience.

Graduate students are expected to demonstrate interpersonal and other communication skills that enable them to communicate effectively with colleagues at all levels. They must also be prepared to communicate with students and society at large. They need to develop writing, speaking, and listening skills.

Delineation of Specific Skills

- Writing
 - Compose scientific publications
 - Design scientific posters
 - Prepare reagent requests
 - Prepare grants
 - Prepare *Curriculum vitae* and cover letters
- Speaking
 - Express research to scientific and lay audiences
 - Organize conference and seminar presentations, including posters and oral presentations with development of materials supporting each.
 - Practice effective skills for job interviews and job talks
- Interpersonal communication skills
 - Assess style, tone, and non-verbal cues
 - Apply performance reviews/feedback
 - Apply conflict resolution, including difficult conversations/minimizing conflict
 - Demonstrate teaching and mentoring skills
 - Employ networking skills

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4. Professionalism

Graduate students are expected to adhere to accepted professional standards and practices within their immediate workplace (e.g., laboratory, office), institution, and discipline. They are also expected to reflect and advance the values of their profession in the community at large.

One's professionalism is relevant in different contexts that govern and define the potential interactions the scholar engages with his/her environment. A proper discussion of professionalism should integrate concepts of:

- Workplace professionalism, connect with the immediate working team
- Institutional professionalism, connect with the research infrastructure
- Collegial professionalism, connect with the discipline of expertise
- Universal professionalism, connect with society in representing an expertise

Delineation of Specific Skills

- Assess and uphold workplace etiquette, performance standards, and project goals
- Comply with rules, regulations, and institutional norms
- Respect, evaluate, and enhance the intellectual contributions of others
- Advance and promote the discipline by participating in public and professional service activities. Identify and manage apparent and actual conflicts of interest, ethical violations, and violations of expected professional behavior

5. Responsible Conduct of Research

Graduate students should receive training in responsible conduct of research so as to improve their ability to make ethical and legal choices. This training should provide them with an appreciation for the range of accepted research practices; familiarize them with the relevant regulations, policies, statutes, and guidelines governing the conduct of their research; and make them aware of the resources to which they can turn when ethical questions and concerns arise.

Graduate students would be expected to:

- Demonstrate their ability to make appropriate ethical and legal choices.
- Demonstrate appreciation for the range of accepted practices for conducting research.
- Recognize the regulations, policies, statutes, and guidelines that govern the conduct of government-funded research, as appropriate.
- Identify the available tools and resources to which they can turn when ethical questions and concerns arise.

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Delineation of Specific Skills

- Data ownership and sharing
 - Recognize ownership and access to data, particularly funding agency rights and intellectual property after the student's enrollment ends.
 - Recognize and respect intellectual property rights, patents, and copyrights
 - Distinguish criteria for authorship and the elements of responsible publication
- Research with human subjects (where applicable)
 - Apply ethical principles for conducting human subjects research, including informed consent and subject confidentiality
 - Recognize federal, state, and local regulations/guidelines for conducting human subjects research
 - Recall Institutional Review Board (IRB) processes and procedures, where applicable
 - Employ requirements for reporting clinical trials
- Research involving animals (where applicable)
 - Apply ethical principles for conducting research with animals
 - Recognize federal, state, and local regulations/guidelines for use of animals in research
 - Employ the Three Rs: Replace, reduce and refine animal use in research
 - Recall Institutional Animal Care and Use Committee (IACUC) processes and procedures
- Research misconduct
 - Recognize applicable definitions of misconduct (federal, ORI/PHS, NASA, NEH, NSF, etc.)
 - Recall reporting procedures
 - Describe the role and risks of being a whistleblower
- Conflicts of interest
 - Assess personal and intellectual conflicts
 - Assess conflicts of commitment
 - Assess financial conflicts
 - Employ confidentiality and recognize bias in peer review
 - Evaluate conflicts and potential competition between mentor and trainee

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6. Leadership and Management Skills

Graduate students should develop the skills, and techniques needed to facilitate effective team work, mentor junior lab members and pursue future leadership opportunities at the local and institutional level.

Delineation of Specific Skills

- **Personnel Management**
 - Practice mentorship and training of junior lab members
 - Work with individuals of diverse backgrounds
 - Demonstrate conflict management/having difficult conversations
- **Project Management**
 - Organize priorities
 - Plan short and long-term objectives
 - Establish and maintain effective collaborations when needed
 - Use record keeping in print and electronic media; establish data back-up protocols
- **Leadership Skills**
 - Identify and clarify project goals
 - Work within a group effectively
 - Demonstrate leadership in meetings
 - Serve as a role model for junior lab members