

VAIGS CORE COMPETENCIES v2

The student can and does:

KNOWLEDGE	Exceptional	Heightened	Advancing	Intermediate	Beginning
Describe key concepts in biomedical science	Evaluate new challenges or controversies relevant to concepts	Recognize and apply key concepts as they appear in new settings	Explain concepts with expanded historical and contextual detail	Describe general concepts correctly and clearly	Describe general concepts with gaps and errors
Place core concepts in the relevant clinical context	Use clinical information to elicit gaps in collective knowledge	Recognize and apply key concepts as they appear in new clinical settings	Connect clinical issues and molecular mechanisms accurately and broadly	Describe clinical context of molecular mechanisms as presented by others	Describe thesis research and disease association in general and limited terms
Know scientific literature relevant to the research area	Evaluate literature beyond the dissertation research area	Compare contradictory publications in the dissertation research area	Understand and evaluate a primary research article	Understand review article descriptions of emerging concepts	Understand biomedical textbook descriptions of key concepts
RESEARCH	Exceptional	Heightened	Advancing	Intermediate	Beginning
Define sound rationale / identify gap in knowledge	Effectively defend given rationale against objections or alternatives	Build expanded rationale for project and experiments	Use rationale to justify priorities for daily work	Understand rationale provided by others	Perform experiments as instructed without considering rationale
Frame appropriate hypothesis	Recognize alternative and testable hypotheses	Independently generate testable hypotheses coupled with specific aims	Generate independent but incomplete hypotheses	Contribute to formation of hypotheses	Accept hypothesis from others
Apply creative and appropriate experimental design	Invent and apply alternative strategies and troubleshoots potential outcomes	Critically evaluate and modify approaches	Seek expert advice & glean novel approaches from literature	Collect and employ appropriate approaches	Execute experiments designed by others
Use controls appropriately	Analyze unexpected results and allow new discoveries to emerge	Apply rigorous controls and use outcomes to redirect experimental path	Incorporate both positive and negative controls consistently	Use controls for most approaches	Perform controls as instructed by others
Execute experiments with technical skill	Generate high technical productivity, publication-quality figures; direct others in technique	Master technical understanding and troubleshoot experimental failures independently	Anticipate results and obtain reproducible results	Exhibit appropriate experimental technique and seek advice when experiments fail	Receive instruction and practice new skills with supervision
Demonstrate critical analysis and thinking	Defend position or hypothesis-driven experiments to expand the field of study	Compare contrary results, yielding multiple new hypotheses	Observe limits of current models; identify gaps in knowledge	Describe experiments that generated current model	Accept current models as accurate and sufficient
Integrate results into relevant models	Create new models that integrate experimental findings with external data; Critique data and analysis of others	Revise extant models based on new data from self or others.	Elucidate logical flaws in current models based on experimental data	Compare new data with prior results from self, same lab, other labs	Accept only those results consistent with hypothesis.

COMMUNICATION	Exceptional	Heightened	Advancing	Intermediate	Beginning
Speak effectively	Elegant communication in multiple settings (conferences, seminars, classroom, mass media, ad hoc).	Present effective poster or platform presentations at conferences; handle questions concisely and effectively; manage logistics and disruptions	Present clear, well-organized research and journal club talks or posters with effective use of schematic and data figures/conclusions	Plan and present journal club or research-in-progress talks for lab or center using simple or pre-set figures	Plan and present short oral summaries in lab meetings or mentor meetings
Write effectively	Present complex models or proposals using elegant language in multiple formats (essay, grant, research or review article)	Present complex models or rationale in cogent, convincing, and concise language	Build coherent and logical argument describing or proposing research studies	Employ standard structures of scientific communication (poster, manuscript, grant formats) with accurate attribution of citations	Write sentences, paragraphs, and essays using established structure and English language standards
Communicate to diverse audiences	Communicate science (one's own or other) effectively to varied audiences (scientists, clinicians, lay)	Communicate research effectively to larger and diverse audiences, wider age ranges	Describe research purpose and outcomes to small audience of lay adults	Convey goal, rationale, approach, and outcomes to scientists beyond lab group	Describe experimental purpose and outcomes to lab peers and supervisor
ETHICAL / PROFESSIONAL PRACTICE					
Manage data with scientific integrity	Demonstrate integrity in shared data; mentor others in appropriate data management	Rectify issues where data were not handled or recorded appropriately; revise record-keeping methods to prevent issues	Coordinate multiple formats for data collection and storage (notebook, electronic files, artifacts, sample identity)	Record data in prescribed format in timely, accurate, and complete manner	Record experimental results with flaws in timeliness, accuracy, and organization
Engage in best authorship practices	Lead collaborative writing team; serve as submitting author; conduct quality peer review of manuscripts or proposals; resolve authorship conflicts	Negotiate scope and structure of project or manuscript with multiple contributors; work out timeline/writing responsibilities	Develop or employ planning process for authoring projects; complete outline and initial draft; effectively edit drafts from others	Participate in design, writing, and editing of collaborative proposals or papers	Complete small assigned writing tasks on time for editing by others
Address ethical problems in scientific research	Counsel others effectively on ways to identify, work through, and resolve ethical problems	Apply effective approaches to address ethical problems; utilize support structures for best outcome	Identify the various stake holders in ethical dilemmas; identify key ethical principles relevant to given situation	Recognize ethical problems in case studies; describe processes to discuss, advise, or resolve ethical issues	Recognize that ethical problems can arise in science
Comply with safety and regulatory standards in laboratory activities	Serve on institutional safety or research review committees	Write protocols compliant with regulatory standards for animal, human, hazardous, or recombinant DNA research	Seek counsel from regulatory staff to improve studies and protocols	Complete training for animal, human, recombinant DNA, hazardous research	Complete minimal lab safety training as required and apply safe practices in laboratory setting
Display appropriate lab citizenship	Serve effectively in leadership role in lab operations and/ or institute initiatives	Serve as role model and mentor in lab skills and professional behavior	Seek guidance from peers and mentors with regard to interpersonal interactions and conflict resolution	Understand implications of one's behavior/attitude in lab and other settings; fulfill assigned lab duties	Treat others with respect; follow laboratory rules and standard practices
Work collegially and effectively as a team / collaborator	Design and lead collaborative projects to successful outcome	Present and accept honest and professional feedback in settings with multiple individuals; share primary project responsibility	Take individual initiative in obtaining input or collaboration from colleagues for specific projects	Work with lab members on shared project with defined individual responsibilities assigned by others	Work on individual project; accept direction and oversight from others