

		student may need significant support	student needs some support to be successful in graduate research	student is prepared for graduate research	area of strength; student is already doing graduate-level work	student has exceptional preparation
Coursework		Student has significant gaps in his/her background and may need to take several undergraduate-level courses before he/she is prepared for graduate-level coursework.	Student's undergraduate institution did not offer courses in one or more areas; OR the student may need to retake some senior-level courses for further mastery before starting graduate-level work.	Student's coursework has given them a sufficient preparation to do graduate-level coursework.	Student has taken at least 1-2 graduate-level physics or astronomy course and showed an adequate grasp of the material.	Student has taken courses for the equivalent of a master's degree.
	communication	verbal	Student struggles to clearly present his/her ideas in talks.	Student needs significant feedback before he/she can deliver a clear and organized short talk.	Student has sought opportunities to teach; OR student can deliver a clear and organized short talk after getting some feedback from faculty or peers.	Student can prepare and deliver an organized and clear 20-minute talk on a technical topic (their own research or someone else's).
		written	Student struggles to write a first draft.	Student first drafts need significant feedback to be clear and organized.	Student can outline a paper and write several sections independently, but needs guidance with several sections (e.g. introduction and/or discussion)	Student is capable of writing a first-author paper with guidance from a faculty member.
Understanding	project motivation	Student focuses on the task at hand without a strong understanding of how it fits into the bigger picture.	Student has learned some of the background material that motivates their research project, but has gaps in his/her knowledge.	Student can give a solid motivation for their own area of research. Student can answer basic questions about their own work.	Student seeks out recent papers to gain a deep understand of how their work fits into the larger body of scientific knowledge.	Student has a strong working knowledge of recent work in their area of research and can answer questions about this body of literature.
	literature /state of the field	Student has not had significant exposure to scientific articles	Student struggles to read scientific papers and extract the key ideas, but understands many textbook-level ideas.	Student can read a scientific paper and explain the big ideas.	Student can read a scientific paper and explain the big ideas. Student regularly reads recent papers and presents these in journal clubs.	Student has a strong working knowledge of the field. Student regularly reads recent papers. Can think critically about the research methods and suggest ways that the work might be extended or improved.
research skills	independence	Student frequently needs help to complete specific research-related tasks.	Student can sometimes complete specific instructions toward the completion of a research task.	Student is able to complete specific research-related instructions. Student relies on faculty for understanding the next step toward completion of a project.	Student is capable of taking a research idea (proposed by faculty) and laying out a game plan for completing that project.	Student works very independently and is capable of taking a project to completion with minimal guidance.
	creativity	Student responds to direct instructions but typically does not go beyond this.	Student asks meaningful questions, but typically performs only those research tasks that he/she has been directly asked to perform.	Student generates his/her own ideas toward the completion of his/her research project.	Student generates his/her own ideas toward the completion of their research project, implements them, and presents them in meetings with faculty advisor.	Student generates their own research project ideas; these ideas have the potential to become publishable papers.

research skills, cont.	problem-solving	Student gives up easily on difficult tasks	Student needs significant support from faculty to complete difficult tasks.	When the student asks for help, they will be able to explain 2-3 different things that they already tried and explain why/how they didn't work.	Student makes several attempts at solving a problem and seeks out a variety of resources (peers, online tutorials, etc.) before asking faculty mentor for help.	Student seeks out novel solutions for difficult problems and can implement them with minimal guidance.
	gritiness	Student gives up quickly when tasks seem daunting.	Student needs significant support and encouragement to persist through seasons of "slow" research progress.	Student needs some support and encouragement to persist through seasons of "slow" research progress, but is generally quite passionate about their work.	Student is capable of staying motivated and persisting through research-related setbacks.	Student shows remarkable passion and perseverance in their research, regardless of the pace of perceived forward progress.
Hard Skills	coding	Student has not had significant opportunities for writing code.	Student can generate plots with minimal guidance.	Student has taken at least 2 coding courses; OR student can write code to perform simple tasks and can debug them with minimal help.	Student actively seeks out novel algorithms to solve problems and interpret data.	Student can read and understand papers describing current CS or ML research. Student engages in interdisciplinary research.
	lab work / observing	Student has not had significant opportunities for working in a laboratory.	Student is comfortable with basic undergraduate laboratory equipment (for example: digital multimeters, oscilloscopes, callipers).	Student has performed laboratory research or has taken upper-level laboratory courses and is comfortable 1-2 pieces of specialized laboratory equipment (for example: electron microscope, x-ray diffraction, machining tools).	Student actively seeks out novel ways to solve laboratory and/or engineering problems	Student can read and understand papers describing current engineering research. Student engages in interdisciplinary research.
	math	Student lacks the background in algebra, linear algebra, and/or calculus to do research and needs additional coursework to be fully prepared.	Student can perform the mathematical manipulations necessary for his/her research project, but lacks fluency and needs substantial support	Student is sufficiently fluent in the mathematics necessary for his/her research project.	Student actively seeks out novel ways to solve mathematical problems.	Student can read and understand papers describing current mathematics, applied mathematics, or statistics research. Student engages in interdisciplinary research.
Professional Skills	meeting deadlines	Student consistently struggles to meet deadlines (and does not have reasonable justification for doing so).	Student tends to over-commit and miss deadlines as a result	Student is reliable.	Student has above-average time management skills and is proficient in prioritizing tasks and spending time working toward meaningful progress.	Student shows exceptional maturity in their professional interactions.
	responding to criticism	Student frequently gets defensive when given suggestions for improving their work.	Student does not incorporate suggestions for improvement into their work.	Student responds well to constructive feedback.	Student learns from his/her mistakes and corrects them in future work. His/her work shows consistent forward progress.	Student has a remarkable self-awareness and is capable of fairly evaluating his/her own work. He/she seeks out opportunities to be challenged and to confront his/her weaknesses
	teamwork & leadership	Student does not work well in teams.	Student tends to prefer a "follower" role, and works well within teams when he/she takes on such a role.	Student works well in teams, both as a leader and as a follower.	Student seeks out opportunities to mentor or to be mentored, to take on leadership or advocacy roles.	Student is a leader among his/her peers, and finds ways to support classmates and peers who struggle.