

# ASTRONOMY AND ASTROPHYSICS

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## Learning Outcomes

### Master of Science (M.S.)

1. **KNOW:** Graduates will demonstrate command of basic observational astronomy and astrophysics, including observing techniques, methods of data analysis, and common theoretical frameworks and techniques.
2. **APPLY/CREATE:** Graduates will apply physics and mathematics knowledge to standard problems in astrophysics, as well as application of statistical principles to data analysis.
3. **COMMUNICATE:** Graduates will clearly and cogently describe the background and motivation of their work, describe their methodology, and present and defend their arguments and conclusions in oral presentations, written papers and reports.
4. **THINK:** Graduates will apply analytical and critical thinking to evaluate research findings reported in scientific journal articles.
5. **PROFESSIONAL PRACTICE:** Graduates will demonstrate working knowledge of the standards for ethical conduct in research through their professional behavior and work.

### Doctor of Philosophy (Ph.D.)

1. **KNOW:** Graduates will demonstrate a breadth of knowledge in astronomy and astrophysics, including observing techniques, methods of data analysis, and common theoretical frameworks and techniques. Graduates will demonstrate depth of knowledge in their subfield, including knowledge of the major techniques and comprehension of the major problems.
2. **APPLY/CREATE:** Graduates will apply physics and mathematics knowledge to standard problems in astrophysics and statistical principles to data analysis. Graduates will create original research in theoretical astrophysics, observational astronomy, or laboratory astrophysics (including but not limited to, instrumentation development). This research entails identifying and evaluating the status of outstanding questions, developing strategies to answer them, and formulating hypotheses and testing them through one or more of the following means: calculations or simulations, model development, analysis of existing data, acquisition and analysis of new data, and design and/or construction of new instruments or methodology.
3. **COMMUNICATE:** Graduates will clearly and cogently describe the background and motivation of their research, describe their research methodology, and present and defend their arguments and conclusions in oral presentations, written papers, and reports. Graduates will synthesize their findings and describe how their work advances major issues in the field and its implications for future research to address open questions.
4. **THINK:** Graduates will apply analytical and critical thinking to evaluate earlier studies that motivate their dissertation work and relevant contemporaneous studies.
5. **PROFESSIONAL PRACTICE:** Graduates will demonstrate working knowledge of the standards for ethical conduct in research through their professional behavior and work. Graduates will put such ethical conduct into practice during their PhD dissertation research and throughout any associated activity.