How will students be graded in the Mentored Scholarly Activity Course?

There are two major components to a student’s grade in the MSA course. 1) Each student will receive a grade (Pass/Fail) at the end of each phase based on their progress through the course Benchmarks. The progress rubric is below. 2) Each student will receive a grade on their final product in Phase IV, based on the Final Product rubric below. Their grade (Pass/Fail,) will be determined by their mentor, associate director (reviewing their papers) and a team of faculty and students reviewing their posters/presentations during the capstone session in March of Phase IV.

**Progress Rubric**

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<thead>
<tr>
<th>Below Expectations</th>
<th>Meets Expectations</th>
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<tr>
<td>Student does not meet established benchmarks for each Phase</td>
<td>Student meets established benchmarks for each Phase</td>
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**Final Product Assessment Rubric**

*Product:* There are 3 parts to the MSA final product.

1. **Paper summarizing your project** – 10 to 25 pages depending on your thematic area, or a published paper in a peer reviewed journal. Most projects will have a paper length of 10 pages. Projects that use a critical analysis methodology (like in the Humanities) will be longer.

2. **Poster** – For most projects, the poster will summarize your paper. For MSA projects in the arts – the poster will include a brief description of your project and the dates/location of your presentation.

3. **Presentation** - For most MSA projects – presentation is of your poster including a brief project summary and being able to answer questions. For MSA projects in the arts – the presentation will be the actual exhibit or performance followed or proceeded by a summary of the work and answering questions.

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<th>Below Expectations</th>
<th>Meets Expectations</th>
<th>Exceeds Expectations</th>
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<tbody>
<tr>
<td>Vague problem statement, research question(s) not measurable; key constructs too broad and/ not clearly defined</td>
<td>Problem statement/hypothesis/aim clear and credible; Key constructs are defined and variables explained</td>
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↑+ Problem statement/question/hypothesis/aim complete and clear; additionally, the problem/hypothesis/aim is compelling and insightful

2. **Selection of an appropriate methodology to answer problem statement/question/hypothesis/aim.**
   ↓ vague or incorrect methodology chosen to answer/address problem/hypothesis/aim; inappropriate research objectives

   ↑ problem statement/question/hypothesis/aim clearly translated into appropriate choices at the design level; appropriate research objectives

   ↑+ problem statement/question/hypothesis/aim clearly translated into appropriate choices at the design level; In addition, selection of methodology represents creative thinking and demonstrates a new or improved approach to a problem

3. **Background Literature Search**
   ↓ Too few citations; Citations not from key journals; key data bases not represented; citations old and not representative of more current work

   ↑ Adequate number of citations from key journals; key data bases represented; citations current; in creative arts – not only written materials – but visual sources / or performances – musical/theatrical performances accessed

   ↑+ More extensive search with many citations from key journals; key data bases represented; citations current; additionally, creativity and diligence in locating relevant literature

4. **Application of an appropriate methodology**
   **Quantitative Data Analysis**
   ↓ Insufficient number/power to answer the question; inadequately designed instrument to answer the question; inadequate statistical analysis performed; invalid results/conclusions; no or inadequate explanation of limitations; inadequate skills applied (e.g. pipetting skills; data base creation and/or manipulation; survey design and analysis)

   ↑ Sufficient number/power to answer the question; adequately designed instrument to answer the question; adequate statistical analysis performed; valid results/conclusions; limitations acknowledged; appropriate lab skills applied (e.g. pipetting skills; data base creation and/or manipulation; survey design and analysis)

   ↑+ Sufficient number/power to answer the question; adequately designed instrument to answer the question; adequate statistical analysis performed; valid results/conclusions; limitations acknowledged; appropriate lab skills applied (e.g. pipetting skills; data base creation and/or manipulation; survey design and analysis); In addition, application of the methodology represents creative input from the student and not just a repeat of established work.
Qualitative Data Analysis
↓ Insufficient documentation of observation (also includes focus groups, document analysis and interviews); inadequate questions; inadequate analysis of transcripts; no or inadequate limitations acknowledged; inadequate checks for reliability of analyses and conclusions; inadequate application of skills (e.g. interviewing, transcribing)

↑ Sufficient documentation of observations including focus groups, document analysis and interviews); appropriate questions which match research objectives; appropriate analysis of transcripts and/or field notes; limitations acknowledged; applied inductive reasoning and generated appropriate inferences; adequate checks for reliability of analyses and conclusions; appropriate skills applied (e.g. interviewing, transcribing)

↑+ Convincing number of documented observations (reached saturation point of focus groups, document analyses and interviews); insightful questions that mirror interesting research objectives; superior analysis of transcriptions leading to novel observations and conclusions; limitations acknowledged; adequate checks for reliability of analyses and conclusions; appropriate skills applied (e.g. interviewing, transcribing); In addition, application of the methodology represents creative input from the student and not just a repeat of established work.

Metaanalysis or Critical Systematic Review of Existing Literature
↓ Inadequately focused question for review; Inadequate identification of criteria for inclusion of articles; missing relevant studies; validity of studies inadequately appraised; inadequate extraction of relevant data – points missed or misinterpreted; bias in the assessment of studies; inadequate comparison of results from study to study; Overall results/conclusions not adequately discussed

↑ Clearly focused question for review; criteria clearly identified for inclusion of articles; all relevant studies included; validity of studies clearly appraised; relevant data extracted from studies; assessment of studies reproducible (more than one reviewer to avoid bias); measuring similar results from study to study so that comparisons are valid; Overall results/conclusions clearly discussed

↑+ Clearly focused question for review; criteria clearly identified for inclusion of articles; all relevant studies included; validity of studies clearly appraised; relevant data extracted from studies; assessment of studies reproducible (more than one reviewer to avoid bias); measuring similar results from study to study so that comparisons are valid; Superior discussion of Overall results/conclusions; In addition, application of the methodology represents creative input from the student and not just a repeat of established work

Historical Analysis
↓ Primary sources not utilized or underutilized; gaps in knowledge not identified; inappropriate or inadequate analysis of sources; appropriate skills not applied (e.g. interviewing, transcribing)

↑ Primary sources utilized; gaps in knowledge identified; appropriate analysis of sources; appropriate skills applied (e.g. locating primary sources)

↑+ Primary sources utilized; gaps in knowledge identified; superior analysis of sources; appropriate skills applied (e.g. locating primary sources); In addition, application of the methodology represents creative input from the student and not just a repeat of established work.

Critical Analysis of texts (literature, ethics, philosophy), laws or policies
↓ Inadequate or inappropriate analysis of texts/laws/policies; arguments undeveloped or unclear; counterarguments not articulated or inadequately articulated; responses to counterarguments absent or inadequately addressed; limitations of analysis not articulated or inadequately articulated; gaps in knowledge not clearly identified or inadequately identified; inadequate discussion of conclusions; appropriate skills not applied or not adequately applied (e.g. legal research)

↑ Appropriate analysis of texts/laws/policies; arguments clear; counterarguments articulated; responses to counterarguments articulated; limitations of analysis acknowledged; gaps in knowledge identified; adequate discussion of conclusions; appropriate skills applied (e.g. legal research)

↑+ Superior analysis of texts/laws/policies; arguments clear; counterarguments articulated; responses to counterarguments articulated; limitations of analysis acknowledged; gaps in knowledge identified; superior discussion of conclusions; appropriate skills applied (e.g. legal research). In addition, critical analysis is creative and not just a review of established work.

Creative Arts (Visual/Performance)
↓ The media (visual/performance) does not adequately communicate the goals of the project; inadequate analysis of the goals; inadequate composition and expression; inadequate aesthetic appeal; inadequate discussion of conclusions; inadequate application of appropriate skills (e.g. photography, dark room, staging)

↑ The media (visual/performance) adequately communicate the goals of the project; adequate analysis of the goals; adequate composition and expression; adequate aesthetic appeal; adequate discussion of conclusions; adequate application of appropriate skills (e.g. photography, dark room, staging)

↑+ The media (visual/performance) communicate the goals of the project in a superior manner; superior analysis of the goals; superior composition and expression; superior aesthetic appeal; superior discussion of conclusions; superior
application of appropriate skills (e.g. photography, dark room, staging); In addition, the work is very creative and not just a review of established work.

5. **Clarity of Poster** (This rubric will be modified for projects in the creative arts where the emphasis is on the presentation.)
   - ↓ disorganized and unclear; missing key component(s) - abstract, introduction, methods, results, limitations, conclusions, references, acknowledgments
   - ↑ well organized and clear; presents complex ideas/data in an understandable way; includes all key components – abstract, introduction, methods, results, limitations, conclusions, references, acknowledgments
   - ↑+ well organized and clear; presents complex ideas/data in an understandable way; includes all key components - abstract, introduction, methods, results, limitations, conclusions, references, acknowledgments; in addition, poster is visually attractive and catches the reviewer’s eye and holds his/her attention long enough to convey its message

6. **Clarity of Presentation**: (This rubric will be modified for projects in the creative arts where the emphasis is on the presentation.)
   - ↓ Summary is disorganized and unclear; missing key components; student unable to respond adequately to questions about the project
   - ↑Summary is organized, clear and concise; all components are present; student able to adequately respond to questions
   - ↑+ Summary is organized, clear and concise; all components are present; student able to adequately respond to questions; additionally, student is able to demonstrate creative and original thinking and is able to apply the concepts of the work to other domains
     complete and clear; additionally, the problem/hypothesis/aim is compelling and insightful

**EXAMPLES of SCHOLARSHIP**

**SOCIAL SCIENCES:**
In college you took a course in the History of the West that piqued your interest in frontier physicians. Dr. Bob Shikes gave a lecture on the history of the School of Medicine at the University of Colorado that really fascinated you. You have decided to do your mentored scholarly activity on frontier physicians. After discussions with Dr. Jackie Glover, Associate Director for the Humanities thematic area, you contact Dr. Shikes as a possible mentor. He gives you many references, including the names of several historians working in the history of medicine at the Downtown Denver and Boulder campuses. You meet with them.

An appropriate mentor is selected from among the interested faculty. You had no idea that there was so much written both about and by frontier physicians. With the advice of your mentor, and after reading many texts, including several survey texts, you have an idea of how to narrow down your topic. You
decide to focus on woman frontier physicians. You discover that Dr. Sonya Erickson, faculty in OB/GYN, did an honors paper on this topic. You meet with her. You spend your time critically reading texts about frontier woman physicians, and reading primary sources. You are working from a very helpful on-line collection of information about women in medicine at the National Library of Medicine. Over the course of the four years, you produce a scholarly paper on Frontier Women Physicians that is thoroughly researched and includes sound critical analysis of major writings and themes. You present your paper at a national humanities meeting and submit it for publication.

**Scholarly Methods In Scientific Research**
Your interests lie in the problem of infectious disease in the third world. Your idea is that learning more about the molecular biology of parasites will provide important information that could be used therapeutically. You look at the mentor list and find that Richard Davis, PhD in Pediatrics (Infectious Disease) is a basic scientist who studies RNA processing and protein translation in the parasitic nematode roundworm, Ascaris.

You go to Dr. Davis web site (http://www.uchsc.edu/molbio/davissr.htm) and learn about his research. Dr. Davis states, “Nematodes infect 3 billion people worldwide, leading to considerable morbidity; they are a problem for livestock and domestic animals; and they result in billions of dollars in annual crop damage. The socioeconomic effects caused by these parasites are severe and present a major obstacle in facilitating medical and economic improvements in many parts of the world. A major goal of our work is to develop tools to facilitate the study of worm parasites in an effort to better understand parasite biology and pathogenesis with the long-term goal of identifying and developing drugs to novel parasite targets”. You read the scientific literature and learn about why the Ascaris system of protein translation different from humans. You contact him about a project and decide to work in his laboratory during the summer of phase 1 and continue during phase 2 in the afternoons.

You work as part of a team that includes graduate students and fellows. Your experiments help Dr. Davis to find a protein that is unique to worms that is used to process mRNA and without the protein the worm cannot propagate. During Phase 3 you attend a meeting and present some of your work about this protein in the parasites. You also co-author a peer-reviewed paper on the subject published by Dr. Davis’s lab. Although you do not materially participate in the lab in most of phases 3 and 4, you follow the field and discover that a number of pharmaceutical companies are developing drugs against the protein you studied. You give a capstone presentation summarizing your work, how it fits into the work of Dr. Davis and the parasite field and the promise of drugs to prevent the disease.

**Scholarly Methods in Epidemiology and Public Health**
You read an article on the epidemiology of dengue and became interested in determining whether the viral infection will become prevalent in the United States, given that it is endemic on the Mexican side of the US-Mexican border.

You meet with your Associate Director and find out that the CDC in Ft. Collins has ongoing research in dengue, and that the Associate Director knows some of the researchers who regularly recruit students to help with research projects.

You visit with researchers at the CDC lab and are impressed with the opportunities. You are particularly interested in the possibility of doing an epidemiologic study of mosquito populations and dengue seroprevalence on the Mexican-US border. You get back in touch with your Associate Director and want to get started. The Associate Director advises that you contact Dr. Fly, a UCHSC faculty member who has ongoing research projects with the CDC in Ft. Collins, and has an interest in dengue surveillance in the southwestern United States. He looks like a good possibility for a mentor.

Dr. Fly contacts his colleague Dr. Bugg at CDC and learns about the surveillance projects planned for the next three years along the US-Mexican border, determines that you will be welcome to help with the research, and agrees to be your mentor. You prepare a proposal for participating in a project that involves setting mosquito traps in communities around Nogales, Arizona and analyzing mosquitoes for dengue
viral RNA, and collecting blood samples from persons who live near the sampling sites and analyzing them for antibodies to the four serotypes of the dengue virus.

You launch the sampling program in the summer between phase 1 and phase 2 of medical school and are able to collect mosquito samples from over 100 locations, and blood samples from over 200 subjects. The samples are analyzed at the CDC lab over the subsequent year by other members of the research team, and the results are provided to you in the middle of phase 2. You work with Dr. Bugg to develop analytic datasets and conduct statistical analyses in the spring of phase 2, and continue to refine analyses in phase 3, while you are completing your clinical rotations. You find evidence that Aedes aegyptae mosquitoes trapped in the US carry the virus and that rates of seropositivity in the US border communities correlate with the percentages of virus-positive trapped mosquitoes. These data suggest that more work need to be done to prevent the breeding of Aedes aegyptae mosquitoes.

At the start of phase 4, you complete a draft report of your research, and refine it for final presentation over the next few months. You also work with your collaborators at CDC to complete a manuscript for publication.

Scholarly Methods in Clinical Research

Your interests are in cardiovascular disease and especially in stroke because a number of your family members have either had a stroke or are worried that they may develop one in the future. As you study your textbooks on cerebrovascular disease, you read about some interesting links between migraine headaches and strokes. One of the books points out that many patients with migraine headaches have also been found to have a patent foramen ovale and there are some data suggesting this may be important in the pathophysiology of migraine and stroke. In your meeting with the Associate Director, you are pointed to some of the potential mentors in the Cardiology Division of the Department of Medicine and in the Neurology Department. It turns out they are actively doing research on this issue.

After reviewing the potential mentors’ areas of interest, you meet with Dr. Smith since her research seems to be the most relevant to you. Dr. Smith is doing a clinical trial looking at the effects of PFO closure on migraine outcomes and she is also examining factors such as nitric oxide and cytokines in migraines. She agrees to work with you as a mentor and suggests some additional readings on the topic both in cardiology textbooks and in journal articles. As you learn more about the problem of nitric oxide and migraine, it becomes clear that there are some major gaps in the literature. One of the gaps is that no one has really pulled together all the data on the effect of transcatheter closure on nitric oxide levels and migraine frequency. So, at the end of Phase 2, you write a proposal for a systematic review. During Phase 3, you continue to meet periodically with Dr. Smith as your clinical work allows and you read about how to conduct a systematic review and meet with one of the Health Sciences Center librarians. At the start of Phase 4, you work steadily to conduct the systematic review and meet several times with Dr. Smith and the librarian to go over your progress and troubleshoot issues in the review. The review includes extensive searching of Medline and other on-line databases, retrieval of meeting abstracts, contacts with manufacturers of catheters to see if there are any unpublished studies on nitric oxide, and contacts with investigators of key studies to verify data or to obtain additional information about their research. Two of the main papers are written in Japanese, so you find a translator to help you extract the relevant data for your project. Based on this review, you are able to make a quantitative summary of the effect of catheter closure on nitric oxide. You, along with your mentor and the librarian, then write an abstract on this for a cardiology meeting during Phase 4. You prepare a draft of your capstone presentation by November of your 4th year and review it with your mentor and the Associate Director. In March you then present your project in a poster form and turn in the paper that is a written summary of your project and its findings.