



Topics

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What is the Advanced Competency (AC) in Research

The Purpose

The purpose of the LSI Advanced Competency (AC) options is to offer specialized learning opportunities in which students gain in-depth knowledge and experience which establishes a level of “competence” in a focused area. Typically these options will be available in LSI Part III (Year 4 of medical school).



What is the Advanced Competency (AC) in Research

Key Body of Knowledge: Each student will have identified a specific biomedical research topic and focused area of research. At the completion of the Advanced Competency in Clinical and Translational Research, the student will have gained an advanced comprehension of the foundational and clinical science underlying a particular topic relevant to human health and disease as well as the research skills necessary to directly engage in discovery.

Curriculum (includes reading assignments, self-directed learning, one on one and small group learning)

Preparation in advance of AC: Students will meet with the course director, research mentor (and research education staff) and course coordinator to identify the biomedical research topic, curricular expectations based on prior research relevant to the project and the amount of time dedicated to the research project in the AC elective, develop a timeline, and review mentor/mentee agreement.

At the completion of the Research AC: the student will earn points towards the Advanced Competency in Clinical and Translational Research. (see AC rubric)

Who is Eligible for the AC in Research?

- Medical Students entering their 4th year of medical school, who have previously completed a mentored research project at the OSUWMC supervised by a COM or other OSU faculty member.



Who is Eligible for the AC in Research

Potential Timing of Research Experiences for an AC in research



AC in Research Requirements

Weekly schedule:

- ✓ One on one meeting with research advisor (1 hour)
- ✓ Daily supervised laboratory/clinical research (minimum 30 hours/week)
- ✓ Attendance at research advisor weekly lab meeting (1-2 hours)
- ✓ Attendance of a journal club (once a month)
- ✓ Attendance at a multi- or inter-disciplinary clinical or research conference relevant to the biomedical research topic
- ✓ Attendance at a multi-lab meeting if relevant (once a month)

Monitoring Student Progress:

- ✓ Student prepares progress report every 2 weeks
- ✓ Final report
- ✓ Log of journal articles or other resources reviewed or used during the course



AC Requirements

Feedback:

The student receives weekly feedback from the research advisor, research staff, laboratory members attending the laboratory meeting

The student receives course instructor feedback based on the monthly electronic progress report prepared by the student

References

Journal articles, research reference materials as directed by the research advisor

Journal articles, research reference resources self-directed by the student

Authorship guidelines accessed on-line under the tab for “Uniform Requirements for Manuscripts Submitted to Biomedical Journals” “Uniform Guidelines for Biomedical Journals” (Vancouver Group Guidelines)

<http://www.icmje.org/>



AC Requirements

Primary and Secondary Learning Objective Examples:

At least two explicit educational goals and learning objectives must be established by the student and research mentor prior to beginning the research project. Examples provided below

- 1. Analyze, interpret and prepare graphic representation of experimental data**
 - a. Use graphic software/applications to graph experimental data (5)
 - b. Determine the reliability/reproducibility and validity of experimental results (5)
 - c. Apply appropriate statistical methods as part of data analysis (10)

Possible points =20

AC Requirements

Primary and Secondary Learning Objective Examples continued:

2. Demonstrate advanced scientific communication skills

- a. Prepare a research abstract and poster presentation to disseminate research results (5)
- b. Prepare an oral research presentation to disseminate research results (10)
- c. Prepare a manuscript for publication in a peer-reviewed journal to disseminate research results (20)

Possible points =35

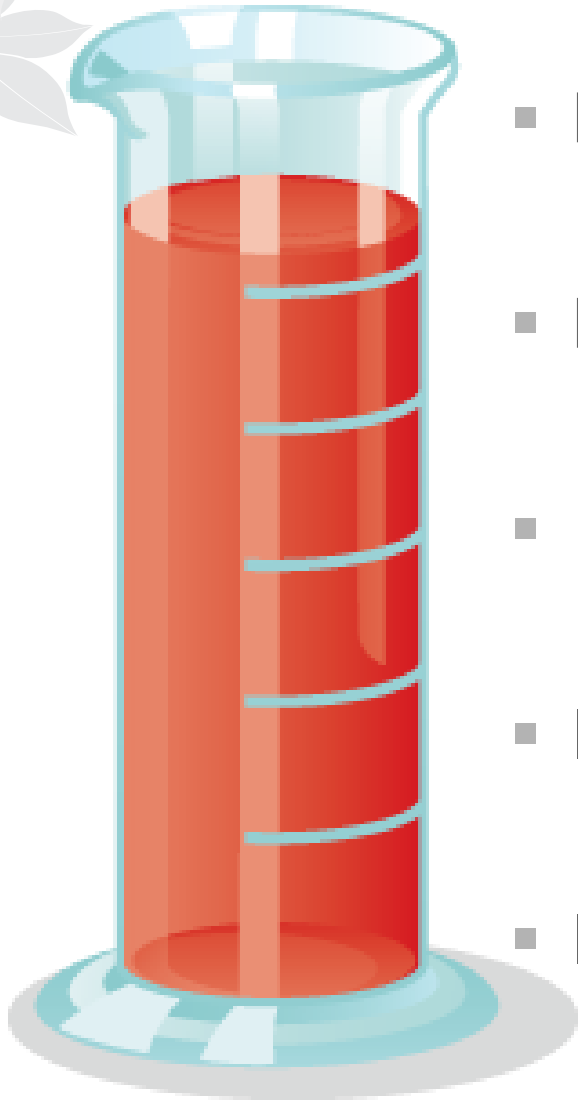
OR

- a. Prepare a proposal for research funding to an extramural sponsor (25)

Possible points =25



Levels of Mastery



- Expert: (450-650 points)
- Proficient: (251-449 points)
- Competent: (101-250 points)
- Intermediate: (51-100 points)
- Introductory: (40-50 points)

Research Advisor Requirements

- Currency of research compliance required for student to conduct research study
- Agreement to provide research mentorship to the student by (documented in signature of the mentor/mentee compact)
- Availability of funds to support conduct of the student's research
- NIH Biosketch: Demonstrable success in conducting research as reflected in extramural research funding, publication in peer reviewed publications, national presentations at scientific meetings and other scholarly endeavors. (submitted online)



Research Advisor Requirements Continued

As a mentor;

- I will provide a written performance evaluation (using the AC in research rubric) with narrative comments to the Associate Dean for the student's final grade. Proper credit can only be granted to the student for this rotation when all requirements, evaluations, and grading are completed.
- As a mentor I agree to weekly meetings with the approved student and that I will be present during the AC programming period.
- I will be committed to the mentoring of the medical student. I will be committed to the education and training of the medical student as a future member of the scientific community. Throughout the student's time in my laboratory, I will be supportive, equitable, accessible, encouraging, and respectful. I will foster the student's professional confidence and encourage critical thinking, and creativity.
- I will help plan and direct the student's project, set reasonable and attainable goals, and establish a timeline for completion of the project.
- I will provide an environment that is intellectually stimulating, emotionally supportive, safe, and free of harassment.
- I will be committed to providing laboratory resources for the student as appropriate or according to my institution's guidelines, in order for him/her to conduct the specific research project.



Research Advisor Requirements Continued

As a mentor;

- I will expect the student to share common laboratory responsibilities, utilize resources carefully, frugally.
- I will not require the student to perform tasks that are unrelated to his/her training program and professional development.
- I will discuss authorship guidelines for publications with the student. I will acknowledge the student's scientific contributions to the work in my laboratory, and I will work with the student to publish his/her work in a timely manner.
- I will discuss intellectual policy issues with the student as needed with regard to disclosure, patent rights and publishing research discoveries.
- I will encourage the student to attend scientific/professional meetings and make an effort to secure and facilitate funding for such activities.
- I will provide career advice. I will provide honest letters of recommendation for his/her next phase of professional development. I will also be accessible to give advice and feedback on career goals.
- I expect the medical student research trainee to exhibit professional behavior and conduct research in keeping with the principles and guidelines of professionalism as described in the OSU College of Medicine's Policy on Professional Behavior.




Applying for the AC in Research

| Competency | Product | Max Points | LSI Curricular Timeline, Responsibility for Assessment |
|---|--|------------|---|
| Perform supervised introductory short-term research under the guidance of a research advisor | Satisfactorily complete a research project performed (5 points per week or per 40 hour unit) | 40-50 | Previously Completed during the summer or Med III part-time with Supervision of OSU Research Advisor |
| Demonstrate "Inquiry" and critical thinking skills by proposing independent research stimulated by a patient encounter, clinical experiences or following an introductory research experience. | Identify an important research question and Develop concept for an independent research project with assistance of research mentor | 10 | Research Advisor |
| Demonstrate competency in "Inquiry" selection of an important biomedical research question and justify its significance based on critical review of the literature. | Perform a literature and information search and Write the Background & Significance section for a research proposal with relevant references and annotate the references with the salient supporting data Identify the gaps in knowledge and rationale for the research | 10 | Research Advisor |
| Demonstrate competency in formulation of a hypothesis relevant to a biomedical research question | Write a hypothesis and diagram the research paradigm based on the hypothesis | 15 | Research Advisor |
| Demonstrate competency in development of research/study design to address hypothesis and associated research questions | Write Specific Aims/Goals for a research study. Write Experimental Details, potential pitfalls, alternative approaches | 25 | Research Advisor |
| Demonstrate competency in application, performance and analysis of a variety of research methods | Demonstrate conceptual and methodological proficiency with at least 3 specific experimental methods (5 points per method) | 15-25 | Research Advisor |
| Demonstrate competency in critical analysis of experimental results, thorough interpretation of data, revision of hypothesis and/or experimental paradigm and identification of new questions | Prepare graphs and PowerPoint presentation of experimental data for at least 4 presentations (lab meeting, local or national conference etc) (20 max) Present and justify interpretation of experimental results in laboratory meeting or other comparable forum a minimum of 4 times (20 max) | 40 | Research Advisor and Evaluation Forms |
| Demonstrate competency in statistical analysis of experimental data | Select and apply appropriate statistical analysis for experimental dataset | 10 | Research Advisor or Biostatistician |
| Demonstrate competency in verbal communication of research findings to a scientific audience by oral presentation of research results | To lay public (5 max) To a group of 6+ peers (5) To scientific audience in a lab meeting. (5) To a scientific audience at a local conference/research in progress or seminar (5) To a scientific audience by abstract selection for presentation at a regional conference (10) To a scientific audience by abstract selection at a national scientific meeting (20) Minimum of 4 occurrences (any combination) | 40 | Research Advisor and Evaluation form |
| Demonstrate competency in written communication of research findings to a scientific audience by submission and acceptance of a 1 st authored publication of research findings in a peer reviewed journal | Submit a 1 st authored manuscript for publication (20) Manuscript revision and response to reviewer comments (10) or Acceptance of manuscript for publication (60) | 60 | Research Advisor and documents below: • Manuscript Draft • Manuscript Revised Draft and Author Response • Published Manuscript |
| Demonstrate competency in critical analysis of the literature by discussing strengths and weaknesses of a selected scientific manuscript at a journal club or lab meeting | Critical analysis of selected scientific manuscripts at a minimum of 3 occurrences of journal club, lab meeting, seminar. (5 each) | 15 | Research Advisor and Evaluation Form |
| Demonstrate competency in responsible conduct of research by identifying and discussing the research compliance and ethical issues relevant to the research project. | Summarize in written form the research compliance and ethical issues and principles for a research project or selected published manuscript. (Minimum of 1 page, minimum of 2 topics) (5 points per topic) | 10 | Research Advisor |
| Demonstrate competency in competition for research funding by identify sources of funding for selected research project, preparing and submitting a research grant application to a national sponsor and analyzing review score, comments, outcome. | Identify sources of funding for an independent research project (5) Prepare a competitive research or scholarship application to support an independent research project (20) or Successful award of a competitive research application to an extramural sponsor (40) | 40 | Research Advisor and documents below: • List of research sponsors • Submitted grant proposal • Award Notification |

- Research AC Rubric
- Outline of specific competencies that can be met during the AC
- Additional objectives are subject to preapproval

Applying for the AC in Research

|  THE OHIO STATE UNIVERSITY College of Medicine | | OSU College of Medicine LSI Research ACAE 1 5/1/2016 - 3/1/2017 |
|---|---|--|
| Advanced Competency Alternate Experience (ACAЕ) in Research Description | <p>Advanced Competency Alternate Experience (ACAЕ) in Research Description: The student will develop advanced competency in research by engaging in a specific hypothesis-driven research project under the direct supervision of a current or prior OSU faculty research mentor. The student is expected to have already developed foundational research skills while working on a summer or Med VII part-time research project under the supervision of his/her ACAЕ research mentor. The student and faculty mentor should discuss and identify at least 2 primary and secondary learning objectives (see example below) to be acquired during the ACAЕ in research over the period.</p> <p>ACAЕ in research Pre-Approval Forms Include: Page 1 (ACAЕ in research general information) Page 2 (basic information about project title, mentor name and department, mentor/mentee acknowledgement of research commitments, Submitted online: Nature of the relationship of continuing research project to previous research project and ACAЕ learning objectives. Research proposal with significance, hypothesis, specific aims, innovation, research design & brief methods) must be submitted online for approval prior to start date. The student will receive instruction and guidance in specific learning objectives which may include competencies in study design, research methods, statistical analysis, research inquiry and critical literature review (see ACAЕ in research evaluation rubric). The student is expected to commit a minimum of 250 hours between May 1st, 2016 and March 1st, 2017.</p> <ol style="list-style-type: none"> Orientation and Course Preparatory Materials: Students will meet with the course director, research mentor (and research staff if applicable) and course coordinator to identify the biomedical research topic, curricular expectations based on prior research relevant to the project and the amount of time dedicated to the research project in the AE, documentation of research compliance, project timeline, and signed mentor/mentee agreement. Weekly schedule (at least "a" and 2 other activities below): <ol style="list-style-type: none"> One on one meeting with research advisor (1 hour) Attendance at research advisor weekly lab meeting (1-2 hours) Attendance at a multi-lab meeting if relevant (once a month) Attendance of a journal club (once a month) Attendance at a multi- or inter-disciplinary clinical or research conference relevant to the biomedical research topic Monitoring of student progress will occur through a written weekly progress report and a final report by the student to be sent to the research mentor and Course Director on Monday of each week. The student will also submit a logging of journal articles or other resources read or used during the AE as well as a list (and dates) of the laboratory meetings, conferences, journal clubs etc. attended during the ACAЕ. | |
| Learning Objectives Description | <p>At least two explicit educational goals and learning objectives must be established by the student and research mentor prior to beginning the research project. Examples provided below: Primary and Secondary Learning Objectives:</p> <ol style="list-style-type: none"> Analyze, interpret and prepare graphic representation of experimental data <ol style="list-style-type: none"> Use graphic software/applications to graph experimental data (5) Determine the reliability/reproducibility and validity of experimental results (5) Apply appropriate statistical methods as part of data analysis (10) Demonstrate advanced scientific communication skills <ol style="list-style-type: none"> Prepare a research abstract and poster presentation to disseminate research results (5) Prepare an oral research presentation to disseminate research results (10) Prepare a manuscript for publication in a peer-reviewed journal to disseminate research results (20) Prepare a proposal for research funding to an extramural sponsor (25) Other educational objective selected from ACAЕ in Research Evaluation Rubric (available at http://go.osu.edu/ACAЕ) | |
| Evaluation Description | <p>Evaluation: The student will be graded on his/her initiative, knowledge and critical thinking, and effectiveness in a research setting. The student will also be required to submit a 1-3 page report on the research project and summary of research accomplishments 1 week prior to the end of the rotation.</p> <p>Assessment & Feedback</p> <ol style="list-style-type: none"> Assessment: Assessment of performance in the advanced competency in research will be performed by the student's research advisor by 1) completion of an evaluation form (see AC rubric modeled after the nationally established CTSA core competencies (attached) which will be used to assess performance on pre-identified learning objectives in addition to 2) a summary narrative (1-2 paragraphs) prepared by the research advisor to describe and evaluate the quality of the student's performance during the ACAЕ in Research. Feedback: The student receives weekly feedback from the research advisor | |
| Prerequisites | <ol style="list-style-type: none"> Agreement of an OSU faculty research mentor to organize and supervise student research training and evaluate student performance in the ACAЕ in research for the specified time period and Submission of Student Preparatory Materials (Forms 1-4) via the MDSR website by April 8th, 2016 Approval of the ACAЕ in research Preparatory Materials by the Associate Dean of Research Education (Ginny Bumgardner MD PhD) is required for the ACAЕ in Research. All students will be notified if they are approved for enrollment no later than May 1st, 2016. | |

- Prior Approval is required by AC Program Manager and Direct
- Research AC application including signatures
 - Submitted online via the MDSR website

Available Credits

■ Block Options:

- 1 credit (150 hours) over a 4 week period
- 1 credit (150 hours) longitudinally (May - March)
- 2 credits (250 ↑) longitudinally (May – March)



Important Dates

**** (see website for exact dates) ****

- AC in Research Preparatory Materials:
 - Application Deadline **early March**
- Commitment of Faculty Research Advisor available to supervise research project during the time period **May – March**
- A 1-3 page final report on the research project and summary of research accomplishments due **Late Feb early March.**
- Faculty Evaluation and Grades due **Med February**

AC in Research Assessment

Assessment of performance in the advanced competency in research will be performed by the student's research advisor:

- ✓ The EBIR rubric (modeled after the nationally established CTSA core competencies)
- ✓ Narrative prepared by the research advisor
- ✓ Research mentor will complete the electronic "COM Medical Student Research Mentor Survey"
- ✓ A record of student research accomplishments will be prepared by the student, signed by the research advisor and reviewed by the COM Research Education Committee.
- ✓ The student will prepare and present an oral presentation to the COM Medical Student Research Education Committee (at least 3 members of the following faculty leaders or their representatives: Vice Dean of Education, Associate Dean for Research Education, Associate Dean for Medical Education, Chair or Vice Chair of Research of Research Advisor's Department)



AC Research Assessment

Upon completion of the AC each student should be able to:

- Determine the reliability/reproducibility and validity of experimental results
- Apply appropriate statistical methods as part of data analysis
- Demonstrate advanced scientific communication skills
- Prepare a research abstract
- Prepare a poster presentation to disseminate research results
- Prepare an oral research presentation to disseminate research results
- Ability to respond to questions about the research presented
- Prepare a manuscript for publication in a peer-reviewed journal to disseminate research results
- Prepare a proposal for research funding to an extramural sponsor

AC Final Reports

General Outline, add content where necessary.

- Abstract - A brief description of background, methods, results, and conclusions (no more than 250 words).
- Introduction - Brief history of topic area with importance of the research project selected. State the hypothesis tests, important references should be cited.
- Methods - Brief description of the methods including statistical methods.
- Conclusion/Results/Findings - Fully discuss the results and their implications. Compare and contrast your findings with the literature.
- Publications and Presentations - Full list of all presentations and publications that have come from or are expected in the future from your project.
- Objectives – Brief description of how you met the objective you selected for the AC in research. Including outcomes and attachments (i.e. posters, graphs, oral presentations, etc.).
- References - Full citations are required including all authors, title, journal, volume, and year. Visit the Health Sciences Library for assistance with proper citations.