Honors Self- Designed Proposal

Complete this proposal **prior** to your experience’s start date and upload it in the UHP Database (<https://webapps.uc.edu/uchonorsstudent>). Create an experience (“Add a new record”) in the “Tracking Project” tab and upload your proposal document as an attachment. The deadline for [submitting proposals](http://www.uc.edu/honors/experiences/experiencesubmission.html) is the 5th of each month (excluding July).

Proposals are intended to be well developed plans for your experience. However, experiences are exploratory in nature, and we are flexible with changes throughout the experience. If your experience changes after receiving approval on your proposal, contact your honors advisor to verify the changes still satisfy the requirements of an honors experience.

**Basic Information**  
Full Name: Chelse Spinner

Title of Project: The Role of Sertoli Cells in the Development of the Reproductive System

Thematic Area(s): Research

Expected Start Date: September 6, 2016

Expected End Date: November 30, 2016

**Guidelines**

1. Proposal submission timeline: Proposals should be submitted at least one month prior to the expected start date of the experience. International experiences require at least two months’ notice. Contact your honors advisor immediately for any exceptions.
2. Proposal length: While the quality of the proposal is most important, strong proposals are typically 3-4 pages single-spaced.
3. Proposal format: Please maintain the proposal format (e.g. headers, layout)
4. Time commitment: Experiences should consist of at least 75-90 hours of preparation, execution, and reflection. This is approximately equivalent to the commitment of honors seminars and pre-approved experiences.

**Requirements for International Travel**

All self-designed international travel experiences require two months’ notice and must be at least one week in length. You will need to provide a detailed itinerary (dates, locations and activities). If participating in independent travel (not with UC faculty, staff or student group), you must also fill out a [Worldwide: Honors Experience application](http://studyabroad.uc.edu/index.cfm?FuseAction=Programs.ViewProgram&Program_ID=10217) via UC International.

Additionally, the [Student Travel Policy](http://www.uc.edu/content/dam/uc/about/docs/university_policies/student_travel_policy.pdf) restricts UC-sponsored travel to countries under a [U.S. Department of State Travel Warning](http://travel.state.gov/content/passports/english/alertswarnings.html). Those who wish to visit a country with a travel warning must seek an [exemption](http://www.uc.edu/international/study-abroad/applying-to-study-abroad/travel-restrictions---exemptions.html) through UC International. Students traveling without a faculty or staff leader must individually request an exemption. ***We cannot allow you to count this travel as an honors experience nor can we give you a grant without an approved exemption.***

1. **Abstract**

Rationale for Chosen Experience: My career goal is to obtain my Ph.D. and become a college professor within the field of science. A Ph.D. is the highest degree and title that an individual can attain that enables one to teach at institutions of higher learning. This achievement denotes that you are a respected scholar in your designated field of expertise, with a sincere desire and commitment to bestow knowledge and information to students via classroom instruction. One of the main reasons I would like to become a teacher is also that it allows me to help other minority students by serving as a mentor, leading and living by example, while offering a hand up. Educators are teachers with a serving spirit and humble attitude seeking to change the world. I would like to give back and leave an impression. This experience is personally meaningful to be because it involves on of my favorite topics, science. Science is a rare and constantly changing field with so many different aspects that can appeal to anyone’s interest. I have chosen this experience as anundergraduate researcher working in the Division of Reproductive Sciences, determining the Sertoli cell defects in maturation/differentiation within male mice, because I believe that by being a part of this research I will gain knowledge and insight into a research area that I find interesting, especially because the research has the ability to contribute to finding a way to combat infertility using immune cells.

I believe that by continuing my participation in this research opportunity at the Cincinnati Children’s Hospital Medical Center (from Summer into Fall Semester), I will receive a hands-on experience of how a life as a Ph.D. would be like. Additionally, Dr. Potter has agreed to share her previous and current research and teaching experiences. As Dr. Sarah Potter has performed research in diverse settings, such as the government, industry, and academia, as well as performed research abroad, she will be able to provide me with input regarding benefits and drawbacks to each of these environments. Other division members, including Dr. De Falco (Dr. Potter’s supervisor) and fellow postdoctoral students in the laboratory and the division will also be available to discuss their personal experiences.

Logistics of Experience: I will be working during Fall Semester on Monday, Tuesday and Wednesday of each week. I will be working 6 hours a week for about 13 weeks of Fall Semester.

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My Goals: From this research experience, I hope to improve upon my critical thinking skills that continue to help me in current upper-level science courses for my undergraduate degree. By improving upon my critical thinking skills, I can apply those skills towards answering scientific questions and specific scientific problems. During a previous research experience, I studied host-parasite relationship between *Drosophila nigrospiracula and Macrocheles subbadius*, however, during the summer I was exposed to another type of research regarding the role of immune cells within male mice, which will helped me gain a very different set of technical skills. Gaining exposure to different types of research will allow me to see the multitudes of opportunities in a future research career and select the field that best fits my interests. During Fall Semester I hope to be able to learn how to become more independent as I begin researching a different component of spermatogenesis.

*Briefly describe the experience. What makes this experience personally meaningful? What goals do you have for this experience? What is your timeline for this experience?*

*\*If you are proposing an international experience, provide an itinerary.*

*\*\*If you are developing this experience from an existing opportunity (class with a study tour, campus organization, co-op, etc.) that is not already an honors seminar or pre-approved experience, how will you differentiate your experience from what is already required of other students?*

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| **Advisor Feedback** | | |
| Must Include:  Brief description of the experience  Personal connection to the experience  Identified goals for the experience  Timeline from start to finish  \*Itinerary (international experiences only)  \*\*Explanation of differentiated experience from what is required of other students | Required Revisions: | Effective: |

1. **Experience Advisor**

*Identify an experience advisor and provide their contact information. Explain why you chose this person and how you plan to utilize your advisor for this experience.*

Note: Advisor(s) should have knowledge or expertise in an area related to the experience. Honors advisors, undergraduate students, and family members cannot be experience advisors.

I have identified Dr. Sarah Potter as my advisor for this experience. She is a postdoctoral fellow in the De Falco Lab at Cincinnati Children’s Hospital Center in the Division of Reproductive Sciences. I chose Dr. Potter to be my advisor, because I have been working closely with her throughout the summer and now continuing into the fall. She has been my mentor during my previous honors experience, therefore I selected her to be my advisor for this proposal, because she has knowledge about the specific techniques that I have been performing, already has an understanding of the background knowledge and literature, which I am continually learning, and has agreed to discuss her previous research and teaching experiences. Additionally, she has written a letter on my behalf to conduct this research and I have worked with her one-on-one over the summer to understand the role of immune cells in the development of the reproductive system, as well as discussed my initial self-designed proposal. I also hope to work with her on my presentation post-fall research and be able to ask for her advice when I share my experience. I believe that Dr. Sarah Potter is the best candidate for my experience advisor because I have worked with her throughout my research in the summer and she has been an integral part of my research experience at Cincinnati Children’s Hospital Research Center so far.

Contact Info: Dr. Sarah Potter

3333 Burnet Ave., MLC 7045

Cincinnati, OH 45229-3039

(513)-833-6602

Sarah.Potter@cchmc.org

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| **Advisor Feedback** | | |
| Must Include:  Experience advisor name and contact information  Description of why advisor was selected  Specific plans to engage with advisor | Required Revisions: | Effective: |

1. **Connection to Learning Outcomes**

*List 3* [*learning outcomes*](#ThematicAreas) *from any thematic area(s). Provide specific activities you plan to engage in to help you make progress towards the chosen learning outcomes. Describe how you expect each activity to help your progress. Include an estimated time commitment for those activities.*

1. Identify and apply appropriate methods to collect and organize data for analysis.

My job during the fall will be to help understand Sertoli cell defects in maturation/differentiation in two different male mouse models. I will begin to understand this by analyzing developmental time points to quantify Sertoli cell number and describe Sertoli cell function in two mutant mouse strains that exhibit disrupted Sertoli cell polarization and lack complete blood-testis-barrier formation. In order to understand the changes in Sertoli cell number and funtion, I will use immunofluorescence staining techniques and cutting edge image software (Imaris). During Fall Semester I will become independent in my ability to perform immunofluorescent staining procedures, capturing images by microscopy, and analyzing the images using software to quantify the staining. This learning outcome will be to become proficient and independent in the entire procedure by the beginning of the experience because it is an extension of procedures that I had learned previously in the summer. Immunofluorescence is utilized in many different fields of interest, so can be applied to other future research endeavors. A significant change in responsibility from summer to fall research will be that I will be given the opportunity to maintain my own mouse colony of the mutant mice strains that are used for this research. I will have to become proficient at separating, clipping, and genotyping the mice as well as making sure the cages are labelled correctly and the mice are in clean cages.

1. Analyze and interpret the meaning of the results.

The main goal of my project is to determine if the mutants have defects before or after the developmental stage that Sertoli cells have matured and blood-testis-barrier has normally formed. While I am mastering the research techniques and utilizing the cutting edge image software, I will also have to learn how to analyze and interpret the meaning of results during the 13 weeks of research. My results will determine the next set of experiments. If we find from our results that the Sertoli cell numbers are normal before this maturation/barrier stage, then we know that there may be an additional issue in these mutant mice during the structuring of the testis during fetal stages, therefore I will then begin to perform fetal dissections and whole mount staining procedures. However, if the experiments inform me that it is only after this maturation/barrier stage that the Sertoli cells increase, then I will perform experiments on other mouse models to understand if the macrophages recruitment is due to the defectiveness of Sertoli cells or the access to haploid spermatids. This learning outcome is most important because it will provide me with the critical thinking skills, which will allow me to excel in school and in my future research career.

1. Articulate the broader significance of the research project and its relationship to other fields, research, and ideas.

In this research, I will be using a genetic approach (two mutant male mouse models) to determine how a macrophages are recruited and understanding their contribution to infertility. By utilizing these mouse models caused by a defective Sertoli cells. A Sertoli cell is a supporting cell that is involved the progression of spermatogenesis and the protection of haploid spermatids from the immune system. Sertoli cell polarization is crucial to its functionality, this polarization helps establish the blood-testis barrier, and helps with the polarity of the Sertoli cells itself. By conducting this research and being able to answer the research question, it can eventually be applied to humans as a possible explanation for infertility in human males. Macrophages have been loosely associated with infertility conditions, if we can demonstrate that they are recruited to destroy sperm upon loss of barrier function, approaches to combat infertility will become possible. I believe that this research has the ability to help understand the causes of infertility and determine a way to limit the number of infertility cases. In order to understand the broader significance of the research project, I will have to understand the results and be able to translate it to real-world examples. This learning outcome will be to apply the knowledge achieved from the results of the experiments to formulate the next set of experiments (approaches to combat infertility by modulating macrophage interactions with the specific cell type that is recruiting them).

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| **Advisor Feedback** | | |
| Must Include:  3 learning outcomes explicitly identified from any thematic area(s)  Examples of activities and explanation of how each will assist the progress towards the chosen learning outcome  Estimated time commitment for each activity | Required Revisions: | Effective: |

1. **Academic Resources Connected to the Learning Outcomes**

*List 1-2 academic resources you plan to use to enhance your understanding of the learning outcomes. Explain how each resource connects to your learning outcome(s) and helps you execute your experience. Please include the title and author/creator for each resource.*

Note: Academic resources are professional works that can be used to assist your understanding of the topic. Some examples are books, documentaries, videos, or research journals.

DeFalco T, Potter SJ,Williams AV, Waller B, Kan MJ,Capel B. (2015) Cell Reports 12, 1107–1119

This paper was selected because of its relevance to the topic, testicular macrophages. This paper sets the stage for my current research by demonstrating that there are two different testicular macrophage populations with different localization and cellular markers.

Potter, S. J., DeFalco, T. Using *Ex Vivo* Upright Droplet Cultures of Whole Fetal Organs to Study Developmental Processes during Mouse Organogenesis. *J. Vis. Exp.* (104), e53262, doi:10.3791/53262 (2015).

The following paper specifically outlines the technique that I will be using while conducting research over the summer. It describes the process of proper mouse fetal dissection and organ immunofluorescence techniques, as an effective method to use when conducting research involving in vivo mouse embryos. I believe that this paper will help me to better understand the processes that I will be using and how they can be used to develop the results of the research.

Sharpe, R., McKinnell, C., Kivlin, C., and Fisher, J. 2003. Proliferation and functional maturation of Sertoli cells and their revelance to disorders of testis function in adulthood. *Reproduction* (125): 769-784.

This paper discusses the role of Sertoli cells in regards to their maturation and their function in the development of the testis. The paper outlines possible reasons as to the Sertoli cells’ role in disorders of testis function during adulthood and the repercussions of malfunctioning Sertoli cells.

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| **Advisor Feedback** | | |
| Must Include:  1-2 academic resources connected to the learning outcomes  Title and author of each resource  Description of how resources will help make progress towards learning outcomes and execution of experience | Required Revisions: | Effective: |

1. **On-going Reflection**

*The on-going reflection should help you process the experience and progress toward your chosen learning outcomes. Describe your method for reflecting throughout the experience. Indicate specific reflection questions/topics you plan to use to guide your reflective process.*

Note: A variety of methods can be used for on-going reflection. Some examples are videos, drawings, blogs, songs, and journals. Reflection topics to consider include your ideas/insights about the experience, connection to other areas of involvement, and your progress towards the learning outcomes.

I will continue to keep a daily log in the form of a laboratory notebook, where I will record all techniques, experiments, results, and next steps to be performed in detail for each day. For the laboratory notebook I will begin to write out preliminary methods for each week in paragraph format, which differs from how I documented my procedures during the summer. Regarding research, I will write down the process of how to formulate a scientific question and how to initiate a new research project. I believe that by documenting my journey over the summer and into the fall semester it will yield knowledge, opinions, and build character all of which I can gain from and assist me on my path toward my future career

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| **Advisor Feedback** | | |
| Must Include:  Method for ongoing reflection  Reflection questions/topics clearly specified | Required Revisions: | Effective: |

1. **Sharing Your Learning**

*Describe how you plan to actively share what you’ve taken away from this experience with a targeted audience. Explain why you chose this specific audience.*

Note: While social media can be an effective platform for sharing, only posting on your personal learning portfolio or social media account(s) does not reach a targeted audience.

I am in the Louis Stokes Alliance for Minority Participation Scholars Program (LSAMP), which is a scholars program that I have been a member of since my freshman year of college and it is for minority students pursuing careers in the STEM (Science, Technology, Engineering, and Mathematics) fields. The goal of the program is to provide resources and programming for minority students while also encouraging them to conduct research, maintain good grades, and give back to the community by volunteering in STEM based community service. The programs holds two conferences each year, one regional and the other national. I have participated in the regional conference last summer, but did not have a research project to present. However, this upcoming October I will have the opportunity to possibly present at the national conference in Chicago, Illinois. I hope to present a my summer research experience in the form of a poster during the conference to be able to encourage other minorities about the importance of conducting research in a STEM field before graduating college. I also believe that having the experience of presenting emphasizes the importance of public speaking and the conference would be a great opportunity for me to network with other LSAMP Scholars across the country. In addition to presenting at the LSAMP Conference, I hope to also present at a Reproductive Sciences seminar at the conclusion of Fall Semester. This would give me the opportunity to hear feedback from other professionals within the field and to also get a chance to share my research experience with others.

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| **Advisor Feedback** | | |
| Must Include:  At least one method to actively share take-aways/learning from the experience  A specific audience and why the audience was selected | Required Revisions: | Effective: |

1. **Budget (if applicable)**

*Provide an itemized budget and indicate your source for cost information.*

*\*If you are engaged in an unpaid internship or research, please indicate the number of weeks and hours per week you plan to participate.*

Working 6 hours per week for a total of 13 weeks.

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| **Advisor Feedback** | | |
| Notes:  Detailed budget of expenditures with sources to justify budget estimates  \*Indicates the number of hours per week and number of weeks of participation | Required Revisions: | Effective: |

**Thematic Area Learning Outcomes**

**Learning Outcomes for the Community Engagement Thematic Area:**

By engaging in this thematic area, you will make progress towards learning how to…

* Identify and differentiate multiple ways to contribute towards the development or achievement of the community’s goals.
* Develop a thorough understanding of the world view, beliefs, experiences, self-consciousness, or history of community members through collaboration.
* Articulate the purpose of service on a social issue or public policy and how service mutually enhances individual growth and the common good.
* Explain how education, advocacy, mobilization, or public policy can influence social issues and transform communities.

**Learning Outcomes for the Creativity Thematic Area:**

By engaging in this thematic area, you will make progress towards learning how to…

* Discover new techniques to gain knowledge, consider options, make new connections, and ask questions.
* Explore a new creative competency/medium or seek new ways to engage an existing competency/medium.
* Understand and optimize the use of people, technology, physical resources or community in a creative process.
* Articulate the broader significance of a creative project and the value of its contributions.

**Learning Outcomes for the Global Studies Thematic Area:**

By engaging in this thematic area, you will make progress towards learning how to…

* Develop practical travel skills that promote safe, stimulating, and productive travel throughout your life.
* Summarize the interconnectedness of geography, history, cultural traits and world issues.
* Articulate the interdependence of professional fields to address current and impending global issues such as technology, the environment, human rights, or politics.
* Demonstrate an understanding of cultural diversity by acknowledging the impact of their own identity and the experience of social norms, customs, or beliefs that are different from their own.
* Demonstrate a sense of empathy, respect, and appreciation for others to build meaningful cross-cultural collaborations toward mutual growth and prosperity.

**Learning Outcomes for the Leadership Thematic Area:**

By engaging in this thematic area, you will make progress towards learning how to…

* Formulate and manage a shared vision and develop goals towards its achievement.
* Motivate and collaborate effectively with others towards completion of shared projects or goals.
* Develop strategies to identify and respond to challenges and obstacles.
* Identify personal strengths and areas of growth and evaluate opportunities to maximize skills and abilities.
* Synthesize the current trends related to a specific issue or field and evaluate how thought-leaders are currently addressing them.

**Learning Outcomes for the Research Thematic Area:**

By engaging in this thematic area, you will make progress towards learning how to…

* Demonstrate the ability to locate, interpret, and critically evaluate primary sources appropriate to field.
* Identify and apply appropriate methods to collect and organize data for analysis.
* Analyze and interpret the meaning of results.
* Produce dissemination appropriate to the field in order to share the results or impact of the research.
* Articulate the broader significance of the research project and its relationship to other fields, research and ideas.