

# **NSF Sponsored Workshop: Training Professionals to Prepare STEM Undergraduates for Research**

University of Central Florida

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June 15-17, 2017



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## **0. Overview and Syllabi Examples**

### **Jump Starting Research: Pre-research STEM Programs**

*Undergraduate research stretches across all types of universities and disciplines. A student's engagement in research has numerous benefits including: critical thinking and communication skills, a deeper understanding of a specific field of study, gaining experience, and the likelihood to continue an educational and professional career in STEM. Many existing research courses are made available to students who are already actively participating in research. However, there are few "pre-research" courses that introduce students to research to help them acquire skills before becoming active research participants. Three existing formats of pre-research courses have been implemented at the University of Central Florida, the University of Alabama, and Washington State University. Data was collected via pre and posttests, focus groups and follow-up surveys to measure the efficacy of these programs.*

**An overview of the three models of pre-research courses held at all three institutions:**

	<b>Faculty-led Boot Camp</b>	<b>Peer-Mentored Short Course (PMSC)</b>	<b>Semester-long Seminar</b>
<b>Originally Developed</b>	One Week: Washington State University (since 2007)	Three-Day: University of Central Florida (since 2004)	Full Semester: University of Wisconsin-Madison (Cadwell, et al., 2009)
<b>Model Overview</b>	Paid experience, 40 hours in one week, institute style	One credit, pass/fail held during the summer, 2.5 days, 20 hours (pre- and post- class assignments), roundtable style	One credit (fall or spring), weekly, 60-90 minutes, online lectures with in-class discussions
<b>Unique Features</b>	Very close group, immersion style, create a research poster, mock interview conducted, invited research lectures	Lab and research tours, student research poster showcase, work occurs in small groups guided by a peer mentor	Online modules in original version. In our adaptation, focus on students writing a literature review through a step by step process, students attend research seminars on campus
<b>Number of Participants</b>	20 (STEM only)	100 (50% STEM)	30 (STEM only)
<b>Taught By</b>	One instructor with guest speakers	Peer mentors assigned to small groups, short lectures by guest speakers and the instructor	One instructor with guest lectures and video / online lectures
<b>Instructor comments and feedback</b>	Week before fall or week after spring classes seems ideal, this is a busy week but completed quickly, builds community	Ideal for transfer and non-traditional students, event logistics are time consuming, can be offered to a large number of students, builds community	Fits into traditional academic schedules and workload, easier to implement if institution has no centralized undergraduate research office

For Clarification:

Peer Mentor Short Course (PMSC) is also known as Summer Research Academy (SRA) at UCF

Peer Mentor Short Course (PMSC) is also known as Research Skills Short Course (RSSC)

Faculty Led Boot Camp (FLBC)

Semester Long Seminar (SLS)

## **Introduction to Research: Peer-Mentored Short Course Sample Syllabus**

### **Contact Information:**

### **Course Description:**

- In the Peer-Mentored Short Course, you will be introduced to various aspects of academic research, with the goal of preparing you to engage in undergraduate research.
- Throughout the course, you will participate in a variety of research-related workshops, facilitated by faculty, staff, and peer mentors, and complete an array of assignments in conjunction with these workshops.
- Based on graded assignments and your attendance, your final grade for this course will be evaluated on a pass-fail basis.
- Current UCF students will be registered for Summer C 2017; transfer students not yet enrolled at UCF will be registered for Fall 2017.

### **Course Requirements:**

Attendance throughout the entire course is mandatory. Completion of the course requires that you participate in all workshops/events, and complete all required assignments before, during, and after the course. See OUR's Policy on Participation for more information regarding the consequences of failing to attend or complete course assignments.

### **Course Objectives:**

- Explore the definition of research across multiple disciplines.
- Identify the skills potentially gained through an undergraduate research experience and how these skills may be applied to a variety of career paths.
- Learn how to identify and approach potential faculty mentors about undergraduate research opportunities.
- Discuss the basic expectations and requirements of the undergraduate researcher when conducting research in an academic or professional environment.
- Develop a solid foundation in research ethics, both conceptually and in an applied manner.
- Examine the importance of strong communication skills to establishing and maintaining a productive relationship with a research mentor.
- Meet faculty and students engaged in research.
- Acquire a general understanding of the opportunities for and demands of graduate studies
  - Learn about UCF research programs and opportunities.
- Explore various sources of information and learn about the differences between primary and secondary literature.
- Practice research writing and how to put together a literature review.

### **Peer Research Mentors:**

You will be assigned a Peer Research Mentor who will be your guide during the course. Peer Mentors will work with you during and after the event to communicate assignments to you, keep attendance, and review all submitted assignments.

### **Office Hours:**

OUR Staff members will be available to help with Pre- and Post-course assignments during the following times:

In Person (In Technology Commons II, room 209)

- Thursday, June 8: 11 a.m. – 2 p.m.
- Tuesday, June 20: 2 – 5 p.m.

Virtual (Through WebCourses):

- Monday, June 12: 4 – 6 p.m.
- Tuesday, June 13: 2 – 4 p.m.
- Thursday, June 22: 4 – 6 p.m.

### **Evaluation Procedures:**

<b>Grade Category</b>	<b>Description of the Requirements</b>	<b>Due</b>	<b>Points</b>
<b>Pre-Course Assignment</b>	<b>This assignment will be posted on Webcourses before the SRA course begins and will be due prior to the start of the course.</b>	12:00 pm, June 15 <i>Submit to Webcourses</i>	18
<b>PMSC Attendance</b>	Attendance is required to all SRA events. Your Peer Research Mentor will take attendance at each event. <i>Missing 10% or more of the Academy will result in failing, see Policy on Participation below</i>	N/A	10
<b>PMSC Participation</b>	PMSC is dependent on the participation of all SRA Scholars. To make PMSC successful you will be required to work with your team and participate in group discussions.	N/A	10
<b>PMSC Assignments</b>	#1: Research Worksheet	8:00 pm, June 15	5
	#2: Interview of Peer Research Mentor	3:30 pm, June 17	5
	#3: Reflection of Site Visits	9:30 am, June 17	5
	#4: Research Skills	9:30 am, June 17	5
	#5: Research Reception/Showcase Assignment	9:30 am, June 17	5
	#6: Research Ethics Assignment	3:30 pm, June 17	5
	#7: Graduate School Assignment	3:30 pm, June 17	5
	#8: Mini Workshops	3:30 pm, June 17	5
<b>Post-Course Assignment (available on Webcourses on June 17)</b>	Online Information Fluency Modules: Recognizing a Research Study, Avoiding Plagiarism, Writing a Literature Review, Moving into Discipline Specific Research	5:00 pm, June 25 <i>Complete PRIOR to the literature review</i>	8

<b>SRA, June 14 at 5pm)</b>	Literature Review	5:00 pm, July 2 <i>Submit to Webcourses</i>	10
Not completing all of the post-course assignment will result in an Unsatisfactory grade for the course	Portfolio Development	5:00 pm, July 2 <i>Submit to Webcourses</i>	5

#### **Grading Scale:**

80-101 points = Satisfactory

Less than 80 points = Unsatisfactory

An Unsatisfactory in the course will make you ineligible from future programming through the Office of Undergraduate Research. Please review and adhere to the *Policy on Participation*.

#### **Turnitin Information:**

In this course we will utilize turnitin through Webcourses, an automated system which instructors can use to quickly and easily compare each student's assignment with web sites, as well as a database of student papers that grows with each submission. You will be expected to submit some assignments in electronic format into Webcourses. After the assignment is processed, as an instructor, we receive a report from turnitin that states if and how another author's work was used in the assignment. No action is required on your part. For a more detailed look at this process, visit <http://www.turnitin.com>.

#### **Ethics Statement:**

As reflected in the UCF creed, integrity and scholarship are core values that should guide our conduct and decisions as members of the UCF community. Plagiarism and cheating contradict these values and are very serious academic offenses. Penalties can include a failing grade in an assignment or in the course, or suspension or expulsion from the university. Students are expected to familiarize themselves with and follow the University's Rules of Conduct.

#### **Disability Access Statement:**

The University of Central Florida is committed to providing reasonable accommodations for all persons with disabilities. This syllabus is available in alternate formats upon request. Students with disabilities who need accommodations in this course must contact the professor at the beginning of the semester to discuss needed accommodations. No accommodations will be provided until the student has met with the professor to request accommodations. Students who need accommodations must be registered with Student Disability Services, Ferrell Commons

Room 185, phone (407) 823-2371, TTY/TDD only phone (407) 823-2116, before requesting accommodations from the professor.

**Policy for Re-Grading:**

If you have any questions about your grade, please consult the instructors for the class. You have seven days from the day your final grade is posted on Webcourses to re-submit work for regrading. After re-grading, please visit our office hours or set up an appointment to further discuss problems with the grade. All resubmission are subject to 100% review, not just specific questions (meaning we will review the ENTIRE assignment again). This is not a forum for complaints without justification. Please only resubmit work under two circumstances: (1) We have added up points wrong on an assignment; We are human so this is bound to happen from time to time. (2) You have strong written justification for why points should not have been taken off of your work. You must be able to back this up with a reference to notes, assignment instructions, etc.

**Syllabus changes:**

The instructor reserves the right to make changes to the syllabus and/or assignment schedule at any point during the semester. It is your responsibility to ensure you have the most up-to-date copy of the course syllabus and note changes when announced. If changes are made to the syllabus when you are not in class it is your responsibility to check with your peers if changes were made. At the instructors' discretion, we will make available an up-to-date copy available online for download.

## **Introduction to Research SLS Sample Course Syllabus**

### **Course Description:**

This course will introduce STEM (Science, Technology, Engineering, and Mathematics) students to academic research and prepare students to engage in undergraduate research at \_\_\_\_\_ and elsewhere.

### **Course Requirements:**

Attendance to all scheduled classes is mandatory. This is an optional foundational class to aid students into moving into undergraduate research. A grade of C or higher is required in this course in order to be eligible for any opportunities through the (your UGR office). Students who drop the course or earn a D/F will be ineligible for opportunities through the Office of Undergraduate Research indefinitely.

### **Course Objectives:**

At the end of this course students will be able to do the following.

- Understand academic research and how science is conducted in an academic setting
- Learn about research in a wide variety of STEM disciplines
- Highlight the basic expectations and requirements of the undergraduate researcher when conducting research with a faculty mentor in a professional environment
- Gain a solid foundation in research ethics, both conceptually and in an applied manner
- Find information sources relevant to your discipline/topic of research interest; determine the differences between primary and secondary literature
- Have the skills to write scientifically (e.g., literature reviews, research proposals) and communicate scientific research
- Have knowledge of the opportunities available to undergraduate researchers throughout their career at (Institution name).

Date	Topic	Assignment
Week 1	Overview of class: Syllabus, Assessment	<i>Homework #1:</i> Research seminars <i>Homework #2:</i> Office hour meeting
Week 2	What is science and academic research Guest Speaker:	<i>Homework #3:</i> Modules Module A - Recognizing research study
Week 3	Finding a mentor and preparing an academic resume	<i>Homework #4:</i> Profile potential mentors <i>Homework #5:</i> Email and resume
Week 4	Research opportunities and graduate school Guest Speaker:	<i>Homework #6:</i> Literature review topic
Week 5	Working with faculty and laboratory etiquette Guest Speaker:	
Week 6	Library skills <b>Meet at the Library</b> Guest Speaker:	<i>Class Assign #1:</i> Library scavenger hunt <i>Homework #7:</i> Six degrees of separation Module B - Google Scholar
Week 7	Reading a journal article	<i>Class Assign #2:</i> Journal - Part I <i>Homework #8:</i> Journal - Part II
Week 8	Research literacy (literature reviews, proposals) Guest Speaker:	<i>Homework #9:</i> Literature review peer draft Module C - Literature review
Week 9	Peer Review Literature Review Group research activity	<i>Class Assign #3:</i> Peer review <i>Homework #10:</i> Literature review second draft Determine group topic
Week 10	Research Ethics I (Publication, authorship, plagiarism, data collection)	<i>Class Assign #4:</i> Ethics worksheet <i>Homework #11:</i> Ethics in science writing Module D - Avoiding plagiarism
Week 11	Communicating Research I - Attend showcase	<i>Class Assign #5:</i> Showcase interviews
Week 12	Research Ethics II (Intellectual property) Guest Speakers:	<i>Class Assign #6:</i> Intellectual property scavenger hunt
Week 13	Communicating Research II - Create a poster	
Week 14	Poster presentation and potluck	<i>Class Assign #7:</i> Poster presentations
Week 15	Final exam	

## Evaluation Procedures:

Grade Category (Point total)	Descriptions of the Requirements	Due Date	Point Value
<b>Class Attendance (10)</b>	Attendance is required. Missing 20% or more of the course will result in a failing grade for the course (i.e. more than one unexcused class meeting).	NA	10
<b>Class Participation (10)</b>	Full participation in the class is essential. This includes, but is not restricted to, in-class discussions, class activities, group work, etc.	NA	10
<b>Final Project (10)</b>	Create a literature review and elevator talk. Details will be reviewed in class.	Final	10
<b>Final Exam (10)</b>	A cumulative exam of the content reviewed during the course.	Final	10
<b>Class Assignments (18)</b> <i>No late assignments will be accepted</i>	#1 Library scavenger hunt	In Class	2
	#2 Journal - Part I		2
	#3 Peer review		4
	#4 Ethics worksheet		2
	#5 Intellectual property scavenger hunt		1
	#6 Showcase interviews		4
	#7 Poster presentations		3
<b>Homework Assignments (42)</b> <i>No late assignments will be accepted</i>	#1 Research seminars (3 seminars)	April 21	6
	#2 Meet with Teaching Assistant (TA)	April 21	1
	#3 Modules		
	a) Recognizing a Research Study	Jan 27	2
	b) Maximizing Google Scholar	Feb 24	2
	c) Conducting a Literature Review	March 17	2
	d) Avoiding Plagiarism	March 31	2
	#4 Potential faculty mentors	Feb 3	4
	#5 Email and resume	Feb 10	4
	#6 Literature review topic	Feb 17	1
	#7 Six degrees of separation	Feb 24	4
	#8 Journal - Part II	March 3	4
	#9 Literature review peer draft	March 17	3
	#10 Literature review second draft	March 30	4
	#11 Ethics in scientific writing	April 14	3

## Grading Scale:

90-100: A	80-89: B	70-79: C	60-69: D	>60: F
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## **Introduction to Research: Faculty-Led Boot Camp Sample Syllabus**

<b>Monday 9:00 – 12:00</b>	Classroom	
Introduction/Welcome	9:00 – 9:45	Instructor
Research Lab Tours	9:50 – 10:10	Faculty Lab 1
*Wear your walking shoes!	10:25 – 10:45	Faculty Lab 2
	11:00 – 11:20	Faculty Lab 3
	11:40 – 12:00	Faculty Lab 4
<b>Monday 1:00 – 4:00</b>	Classroom	
Making a resume		Instructor
<b>Tuesday 9:00 – 12:00</b>	Classroom	
Types of literatures and Sources		Guest Speaker
<b>Tuesday 1:00 – 4:00</b>	Library	
Library Skills Game		Librarians
<b>Wednesday 9:00 – 12:00</b>	Classroom	
Laboratory Notebooks		Instructor
<b>Wednesday 1:00 – 4:00</b>	Classroom	
How to make a research poster		Guest Speaker
<b>Thursday 10:00 – 12:00</b>	Classroom	Guest Panelists
Career Panel		
<b>Thursday 1:00 – 4:00</b>	Classroom	
Writing a technical abstract		Guest Speaker
<b>Friday 9:00 – 12:00</b>	Classroom	
Patents and Intellectual Property		Guest Speaker
<b>Focus Group 12:00 – 1:00</b>	TBD	
<b>Friday 1:00 – 3:00</b>	Classroom	Instructor
Wrap-up, assessment survey		

**Introduction to Research I (IDS 3913)**  
**T-L.E.A.R.N.™ Program at UCF – Fall 2016**  
**Thursdays, 4:30pm-5:45pm**  
**Burnett Honors College, Room 0127**

Dr. Kimberly Schneider Interim Assistant Dean, College of Undergraduate Studies Director, Office of Undergraduate Research Location: Technology Commons II, Room 209 Office Hours: By appointment	Mrs. Colleen Smith LEARN@ucf.edu Coordinator, L.E.A.R.N. Location: Technology Commons II, Room 209 Office Hours: Thursdays 2:00 PM-3:30PM in Technology Phone number: 407-823-3125 Commons II, Suite 209, and by appointment. Phone number: 407-823-1797
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**Course Description:**

This 1-credit course will introduce T-L.E.A.R.N. students to academic research and prepare them for engagement in undergraduate research as first-year UCF students in Science, Technology, Engineering, and Mathematics (STEM) disciplines. Additionally, the course will assist students in developing and applying strategies for success to appropriately adjust and succeed to the rigorous expectations of UCF and the academic research culture.

**Course Requirements:**

Attendance to scheduled class is mandatory. IDS 3913 is the foundational class of the T-L.E.A.R.N. program. Students have to participate in and pass this course (C or higher) in order to move into Introduction to Research II (IDS 4914) in the spring 2017 term, receive the T-L.E.A.R.N. scholarship, and continue their participation in the T-L.E.A.R.N. program.

**Course Objectives:**

At the end of this course, students will be able to

- Explore the definition of research across multiple disciplines
- Learn about research in a wide variety of STEM disciplines
- Highlight the basic expectations and requirements of the undergraduate researcher when conducting research with a faculty mentor or in a professional environment
- Discuss and apply research-based success strategies and skills to daily practices as a college student and undergraduate researcher
- Learn how to maximize their learning through self-awareness, self-motivation, and self-management
- Find information sources and determine the differences between primary and secondary literature
- Find literature related and relevant to your research apprenticeship
- Recognize and develop ideas for a research proposal
- Gain knowledge of the opportunities available to undergraduate researchers throughout their career at UCF

**Attendance Policy**

Reasons for acceptable absences may include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligations, severe weather conditions, and religious holidays. Documentation is required for excused absences.

## **Participation**

Participation grades will be based on arriving to class on time, participating in class activities and discussion, displaying engaged behavior, being prepared with course materials, using digital devices in the course appropriately, following instructions, collaborating and working with peers, and communicating with peers and instructors positively and professionally. Use of phones is prohibited, and using phones or other electronic devices during class will result in a reduction in your participation unless noted by instructor.

## **Late Assignments**

Late submission of assignments will be accepted for each assignment. A deduction of 10% will be taken off of the final grade every 24 hours after the assignment deadline for up to five business days after the due date.

<b>Week</b>	<b>Date</b>	<b>Topic</b>	<b>Assignment</b>
1	August 25	Syllabus Review In-Class Assessment	<u>Class #1:</u> STEM Interest Inventory (document involvement) <u>Homework #1:</u> LEARN Program Quiz ( <b>Due August 26, Fri by 11:59pm</b> )
2	September 1	What is Science and Academic Research	<u>Homework #2:</u> Transition Reflection ( <b>Due September 7, Wed</b> )
3	September 8	Getting Started: Being a successful STEM transfer student	<u>Class #2:</u> Semester At A Glance and Virtual Resource Tour <u>Homework #3:</u> Laboratory Safety Modules ( <b>Due October 3, Mon</b> )
4	September 15	Professional First Impressions, Finding Faculty Mentors, Email Etiquette, and OUR resources	<u>Class #3:</u> Email Activity <u>Homework #4:</u> LinkedIn Profile and Faculty and Research Review ( <b>Due September 28, Wed</b> )
5	September 22	Working with Faculty/Graduate Students & Laboratory Etiquette	
6	September 29	Lab Tours (around campus)	<u>Homework #5:</u> Lab Site Reflection Worksheet ( <b>Due October 5, Wed</b> )
7	October 6	Laboratory Safety Guest Presenters <i>Location: TBD</i>	
8	October 13	Research Skills Part I: Finding Literature Guest Presenter: Mr. Richard Harrison <i>Location: Library, 235C</i>	<u>Class #4:</u> Library Scavenger Hunt Worksheet <u>Homework #6:</u> Library Modules ( <b>Due October 19, Wed</b> )

9	October 20	Research Skills Part II - Reading Primary & Secondary Literature	<u>Class #5:</u> Reading Primary & Secondary Literature <u>Homework #7:</u> Finding Literature and Bibliography Worksheet ( <b>Due November 9, Wed</b> )
10	October 27	The Research Process – Asking Good Questions, Peer Review, Manuscripts, & Grants (Update: Finding mentors)	<u>Homework #8:</u> Proposal Topic Review Sheet & Research Literature Synthesis <b>(Due November 16, Wed)</b>
11	November 3	Off- and On-Campus Research and Internship Opportunities	<u>Final Exam Part I:</u> Annotated Bibliography & Outlined Literature Review ( <b>Due December 9, Fri by 1:00PM</b> )
12	November 10	Graduate School 101	<u>Homework #9:</u> Graduate School Program Review ( <b>Due November 30, Wed</b> )
13	November 17	Creating a Portfolio- Resumes, Cover Letters, and Personal Statements	<u>Final Exam Part II:</u> Identify Summer Internship/Research Program and Submit Resume/Cover Letter Draft ( <b>Due December 9, Fri by 1:00PM</b> )
14	November 24	<i>No Class: Enjoy your holiday!</i>	
15	December 1	Effective Communication, Best Practices of Undergraduate Researchers	
Final Exam	December 8	No Class: <b>Submit Final Exam via Webcourses (Part I and II) Due December 9, Fri by 1:00PM</b>	Final Exam: Focus Group Thursday, December 08, 2016 4:00 PM – 6:50 PM

\*Slight changes in the schedule might occur. Students will be given advance notice of any changes.

#### Evaluation Procedures:

Grade Category	Description of the Requirements	Due Date and Time	Point Value
<b>Class Attendance (15)</b>	Attendance is required for both the class and research apprenticeship. <i>Missing classes without a valid excuse jeopardizes your grade in the course and status in the program.</i>	NA	15

<b>Class Participation (15)</b>	Full participation in the class is essential. This includes, but is not restricted to, in-class discussions, class activities, field trips, group work etc.	NA	15
<b>Class Assignments (20)</b> No makeup assignments	#1 In-Class Assessment	In class	4
	#2 Semester at a Glance & Virtual Resource Tour		4
	#3 Email Activity		4
	#4 Library Scavenger Hunt Worksheet		4
	#5 Reading Primary and Secondary Literature		4
<b>Homework Assignments (30)</b>	#1 L.E.A.R.N. Program Quiz	August 26	1
	#2 Transition Reflection	September 7	2
	#3 Laboratory Safety Modules	October 5	5
	#4 LinkedIn Profile & Faculty and Research Review	September 28	4
	#5 Lab Site Reflection Worksheet	October 3	3
	#6 Library Modules	October 19	6
	#7 Finding Literature and Bibliography Worksheet	November 9	3
	#8 Proposal Topic Review Sheet & Research Literature Synthesis	November 16	5
	#9 Graduate School Program Review	November 30	1
<b>Final Exam (20)</b>	Part 1: Summer Internship/Research Program Resume and Cover Letter Draft	December 9	10
	Part 2: Annotated Bibliography and Outlined Literature Review	December 9	10

### Email Communication

All course communication must come from your Knights email account. Your subject line should include IDS 1911, YOUR NAME, SUBJECT OF EMAIL (i.e., IDS 1911, John Doe, Library Modules Issue). The body of the email should address Mrs. Smith and/or Dr. Schneider, include your message/questions, and signature.

### Ethics Statement

As reflected in the UCF creed, integrity and scholarship are core values that should guide our conduct and decisions as members of the UCF community. Plagiarism and cheating contradict these values and are very serious academic offenses.

Penalties can include a failing grade in an assignment or in the course, or suspension or expulsion from the university. Students are expected to familiarize themselves with and follow the University's Rules of Conduct (see <http://osc.sdes.ucf.edu/process/roc>).

### **Questions about grading?**

You have **seven days** from the day your assignment grade is posted on Webcourses to resubmit work for re-grading. After re-grading, please visit our office hours or set up an appointment to further discuss problems with the grade. All resubmissions are subject to a 100% review, not just specific questions (meaning we will review the ENTIRE assignment again). This is not a forum for complaints without justification. Please only resubmit work under two circumstances: (1) We have added up points wrong on an assignment; We are human so this is bound to happen from time to time. (2) You have strong written justification for why points should not have been taken off of your work. You must be able to back this up with a reference to notes, assignment instructions, etc.

## **Introduction to Research II (IDS4914) T-L.E.A.R.N. Program Spring 2017**

Dr. Kimberly Schneider  
Assistant Dean, College of Undergraduate Studies  
Director, Office of Undergraduate Research  
Location: Technology Commons II, Room 209  
Office Hours: By appointment  
Phone number: 407-823-3125

Mrs. Colleen Smith  
LEARN Coordinator  
[LEARN@ucf.edu](mailto:LEARN@ucf.edu)  
Location: Technology Commons II, Room 209  
Office Hours: Thursdays, 3:15pm-4:15pm (before class)  
and by appointment  
Phone number: 407-823-1797

#### **Course Description:**

This 1-credit course will introduce T-L.E.A.R.N. students to academic research and prepare them for engagement in undergraduate research as in Science, Technology, Engineering, and Mathematics (STEM) disciplines. Additionally, the course will assist students in developing and applying strategies for success to appropriately adjust and succeed to the rigorous expectations of UCF and the academic research culture.

#### **Course Requirements:**

Attendance to scheduled class is mandatory. IDS 4914 is the second preparatory class for T-L.E.A.R.N. participants and they must pass this course with a C or higher to successfully complete the T-L.E.A.R.N. Program. This course is paired with students conducting research 10-15 hours per week with a UCF faculty mentor.

#### **Course Objectives:**

At the end of this course, students will be able to:

- Highlight the expectations and requirements of the undergraduate researcher when conducting research with a faculty mentor or in a professional environment
- Discuss and apply research-based success strategies and skills to daily practices as an undergraduate researcher Find literature related and relevant to your research project
- Recognize and develop ideas for a research proposal
- Gain knowledge of the opportunities available to undergraduate researchers throughout their career at UCF Differentiate scholarly resources from popular works and consistently uses them as appropriate for the discipline.
- Critically evaluate sources.

- Explore embedded questions in a clear, scholarly context and integrates evidence within writing (e.g., confirmatory and contradictory evidence, canonical and unconventional theories, etc.)
- Define accurate and complete assembly and analysis of information, data, and observations.
- Communicate fully follows the correct formatting and is presented at an appropriate level, targets the appropriate audience, and uses an appropriate (scholarly) tone without errors.

#### Attendance Policy

Reasons for acceptable absences may include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligations, severe weather conditions, and religious holidays. Documentation is required for excused absences.

#### Participation

Participation grades will be based on arriving to class on time, participating in class activities and discussion, displaying engaged behavior, being prepared with course materials, using digital devices in the course appropriately, following instructions, collaborating and working with peers, and communicating with peers and instructors positively and professionally. Use of phones is prohibited, and using phones or other electronic devices during class will result in a reduction in your participation unless noted by instructor.

#### Late Assignments

Late submission of assignments will be accepted for each assignment. A deduction of 10% will be taken off of the final grade every 24 hours after the assignment deadline for up to five business days after the due date.

	Date	Topic	Assignment
Week 1	Jan. 12	Syllabus Review and Semester Overview	<i>Homework #1 - LEARN Program Quiz (DUE Jan. 13 by 11:59PM)</i> Submit Research Lab Log
<b><u>Part I: Background, Introduction, and Literature Review</u></b>			
Week 2	Jan. 19	Technical Writing Part I: Background and Literature Review	<i>Class Assignment #1: Part I Examples</i> <i>Homework #2: Part I - First Draft (Due Feb 1 by 11:59PM)</i> Submit Research Lab Log
Week 3	Jan. 26	<i>No Class- Work on Proposal (Extended Office Hours with Mrs. Smith)</i>	Submit Research Lab Log
Week 4	Feb. 2	Research Ethics	<i>Class Assignment #2: Ethics Case Studies</i> Submit Research Lab Log
Week 5	Feb. 9	Peer Review of Part I- Literature Review	<i>Homework #3: Part I - Peer Review (DUE Feb. 15 by 11:59PM)</i>

		*Bring your laptop*	Submit Research Lab Log
	<b>Part II- Methods and Expected Results</b>		
Week 6	Feb. 16	Technical Writing Part II: Methods and Expected Result Overview	<i>Class Assignment #3: Part II Examples</i> <i>Homework #4: Part II - First Draft (DUE Feb. 22 by 11:59PM)</i> Submit Research Lab Log
Week 7	Feb. 23	Graduate Program Review <i>Guest Speaker: Mr. Michael Aldarondo-Jeffries</i>	<i>Homework #5: Part II – Peer Review (DUE Mar. 1 by 11:59PM)</i> <i>Homework #6: Graduate School Program Review (Due Mar. 1 by 11:59PM)</i> Submit Research Lab Log
Week 8	March 2	Technology Transfer <i>Guest Speaker: Ms. Andrea Adkins</i>	<i>Class Assignment #4: Technology Transfer Worksheet</i> <i>Homework #7: Part II – Revised Draft (DUE Mar. 8 by 11:59PM)</i> Submit Research Lab Log
	<b>Part III - Poster and Final Proposal Paper</b>		
Week 9	March 9	Communicating Research: Preparing a Poster and Presenting	<i>Homework #8:Part III – First Draft (DUE Mar. 29 by 11:59PM)</i> Submit Research Lab Log
Week 10	March 16	No class: Spring Break	Enjoy, Be Safe & Relax
Week 11	March 23	Research in Industry <i>Guest Speakers in Neptune Multipurpose Room</i>	Submit Research Lab Log
Week 12	March 30	Peer Review of Part III- Poster *Bring your laptop*	<i>Class Assignment #5: Poster Peer Review</i> Submit Research Lab Log
Week 13	April 6	Part III - Group A Poster Presentations	<i>Class Assignment #6A: Presentation Review</i> <i>Final Proposal Project Due- Poster (Group A)</i> Submit Research Lab Log
Week 14	April 13	Part III - Group B Poster Presentations	<i>Class Assignment #6B: Presentation Review</i> <i>Final Proposal Project Due- Poster (Group B)</i> Submit Research Lab Log

Week 15	April 20	Assessment	<i>Class Assignment #7: Post-Assessment Submit Research Lab Log</i>
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<b>Part IV – Wrap Up</b>			
	April 25 – Study Day	Appreciation Reception	Submit Research Lab Log
Final Exam	April 27	Focus Group - 4:00pm-6:50pm	

\*Slight changes in the schedule might occur. Students will be given advance notice of any changes.

#### Email Communication

All course communication must come from your Knights email account. Your subject line should include IDS 1911, YOUR NAME, SUBJECT OF EMAIL (i.e., IDS 1911, John Doe, Library Modules Issue). The body of the email should address Mrs. Smith and/or Dr. Schneider, include your message/questions, and signature.

#### Ethics Statement

As reflected in the UCF creed, integrity and scholarship are core values that should guide our conduct and decisions as members of the UCF community. Plagiarism and cheating contradict these values and are very serious academic offenses. Penalties can include a failing grade in an assignment or in the course, or suspension or expulsion from the university. Students are expected to familiarize themselves with and follow the University's Rules of Conduct (see <http://osc.sdes.ucf.edu/process/roc>).

#### Questions about grading?

You have seven days from the day your assignment grade is posted on Webcourses to resubmit work for re-grading. After re-grading, please visit our office hours or set up an appointment to further discuss problems with the grade. All resubmissions are subject to a 100% review, not just specific questions (meaning we will review the ENTIRE assignment again). This is not a forum for complaints without justification. Please only resubmit work under two circumstances: (1) We have added up points wrong on an assignment; We are human so this is bound to happen from time to time. (2) You have strong written justification for why points should not have been taken off of your work. You must be able to back this up with a reference to notes, assignment instructions, etc.

#### Evaluation Procedures:

Grade Category	Description of the Requirements	Due Date	Point Value
Class Attendance (10)	Attendance is required for both the class and research apprenticeship.	NA	10

<b>Research Logs (25)</b>	Weekly online logs documenting research. <u>Each week a log should be submitted</u> to document your progress in the lab.	Sunday by 11:59PM, submit via Webcourses	15
		Faculty Evaluation	10
<b>Class Participation (10)</b>	Full participation in the class is essential. This includes, but is not restricted to, in-class discussions, class activities, field trips, group work etc.	NA	10
<b>Class Assignments (10)</b> No makeup assignments	#1 Part I – Literature Review Examples	In class	1
	#2 Ethics Case Studies		1
	#3 Part II - Methods and Expected Results Examples		1
	#4 Technology Transfer Worksheet		1
	#5 Part III - Poster Peer Review		2
	#6 Part III - Presentation Reviews		2
	#7 Post-Assessment		2
<b>Homework Assignments (31)</b>	#1 L.E.A.R.N. Program Quiz	Jan 13	1
	#2: Part I - Literature Review First Draft	Feb 1	3
	#3: Part I - Literature Review Peer Review	Feb 15	4
	#4: Part II - Methods and Results First Draft	Feb 22	5
	#5: Part II - Methods and Results Peer Review	Mar 1	4
	#6: Graduate School Program Review	Mar 1	4
	#7: Part I & II- Literature Review, Methods and Results Revised Draft	Mar 8	2
	#8: Part III - Poster First Draft	Mar 29	5
<b>Final Proposal Project (14)</b>	Students will develop a research proposal throughout the semester. This proposal will be presented at the end of the semester to the class in a poster format. The top three or four LEARN posters (voted by peers) will be printed and presented at the LEARN reception.	POSTER: Day before presentation (submitted to Webcourses by 11:59PM and presented in class)	7

		PAPER: Apr 27 @ 1:00PM (submitted to Webcourses)	7
<b>Final Exam</b>	Focus Group - 4:00pm-6:50pm	Apr 27	1

## **I. Professional Development and Resources**

**Description:** This module expresses the basic fundamentals of communicating with faculty, necessary pre-research steps, and familiarizing students with their undergraduate research office and what resources are available to them.

**Learning objectives:** Students will learn key points of a strong resume, understand proper email etiquette, become knowledgeable of research opportunities at their institution and campus resources (writing centers etc.).

**Assignments and activities:**

- I. Mock Email to a Potential Mentor
- II. Personal Resume
- III. Critique Resume Samples
- IV. Mock Interview Activity
- V. Mentor/student Relationships

## **Student Assignment: Emailing Research Faculty and Preparing Your Resume**

**Objective:** At most research universities, the number of students seeking research opportunities far exceeds the number of available slots. Aside from your timing, one of the most important factors that will influence your chances in obtaining a research position is your initial contact with the faculty mentor. To improve your chances, a well-constructed email and resume are key. Your assignment is to prepare a mock email inquiring about research opportunities with one of two faculty members you identified previously, and update your professional resume for attachment.

### **Step I: Draft an Email**

Based on the information you have gathered, create a mock email to a faculty mentor describing your desire to do research in their lab. The content in this email should be concise and briefly demonstrate an understanding of the mentor's research.

Example Template:

Subject: Undergraduate Research

Dear Dr. XXXXX,

<Insert content>

Sincerely,

<Your Name>

### **Step II: Update Resume**

Prepare/update your one-page resume. Your resume should have the following: proper and consistent formatting; correct spelling, grammar and punctuation, appropriate sections with relevant and specific experiences, and experiences listed in reverse chronological order. You may wish to include this STEM course, as it is a competitive program.

# *Abraham Colon*

17893 Knights Circle Orlando, FL 407-856-9999

[catchphrase898@gmail.com](mailto:catchphrase898@gmail.com)

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**Objective:** Get some research experience before I apply to get my Master's in Psychology.

**Work experience:**

*Target, Customer Service Representative, May 2011-Current*

- I talk with customers about their complaints and try to return their items if they are not past the return date. I also work on the register from time to time when I am needed.

*Chuck E. Cheese, Food Preparation Assistant, August 2010-May 2011*

- When I worked at Chuck E. Cheese, I unpacked frozen pizzas and hamburgers and put them in the respective places in the cooler. I also popped popcorn when it was empty and cleaned the bathrooms once a day.

**Education:**

*University of Central Florida, Orlando, FL*

B.S. in Psychology, May 2014

Relevant coursework: Statistics, Art History, Biology, American History I

*High Water High School, Buena Vista, FL*

2.9 GPA, May 2011

Relevant coursework: Introduction to Psychology

**Skills:**

*Computer:* Microsoft Word, PowerPoint, Excel, and Access

*Language:* Chinese (Kind of Fluent), English (Fluent)

**Achievements:**

Peer Mentor Short course Participant, Summer 2012

Dean's List, Fall 201

Katie Rivers  
1515 Valencia College Lane, Orlando, FL  
407-555-9876 • [thatsboss@knights.ucf.edu](mailto:thatsboss@knights.ucf.edu)

EXPERIENCE

**Publix, Orlando, FL** May 2012-Present  
*Meat Cutter Associate*

- Providing premier customer service
  - Cutting and preparing all varieties and cuts of meat
  - Helping to verify and unload meat deliveries from trucks
  - Maintaining, filling and rotating product in meat cases
  - Moving meat from coolers to cutting area and returning meat to coolers
  - Training other associates
  - Cleaning equipment
  - Assisting in other duties as assigned

**Old Navy, Orlando, FL** April 2010-March 2011  
*Sales Associate*

- Maintaining and replenishing inventory
  - Arranging inventory on the store floor
  - Tagging merchandise
  - Setting up promotional material and displays
  - Reorganizing items
  - Maintaining a neat and tidy store

EDUCATION

**UCF, Orlando, FL** May 2013-Present  
B.S. of Computer Information Technology  
Minor in Psych  
3.0 GPA

**Relevant Coursework:** Spreadsheet Applications, Microcomputer Applications, Programming in Visual Basic, PC Essentials, Internet Technologies, PC Desktop Support, PC Essentials, Security Fundamentals, Intro to Systems Analysis and Design, Practical PC Technician, Java Programming, Web Programming, Survey of Electronics, Networking Fundamentals

## **ERIC LAWSON**

4000 Central Florida Blvd  
Orlando, FL 32817  
[ericlawson@knights.ucf.edu](mailto:ericlawson@knights.ucf.edu)  
407.555.5555

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### **OBJECTIVE**

A summer internship or co-op in mechanical engineering.

### **EDUCATION**

**University of Central Florida**, Orlando, FL

B.S. in Mechanical Engineering

3.4 GPA, May 2016

**Lake Nona High School**, Orlando, FL

4.2 GPA, May 2012

### **ENGINEERING EXPERIENCE**

**Hovercraft Project**, Orlando, FL

Team Member, Fall 2012

- Designed a hovercraft capable of performing specific maneuvers with established time constraints.
- Researched potential designs, materials and power supplies.
- Worked with a team of engineering students toward a common goal.

### **WORK EXPERIENCE**

**Lawsons Electric**, Orlando, FL

Electrician Assistant, Summer 2012

- Helped install residential and commercial wiring in new and old construction.
- Investigated electrical problems and proposed solutions.
- Developed ability to read electrical diagrams and wire electrical panels.

**Landscaping Business**, Orlando, FL

Owner, May 2009 - December 2011

- Managed all aspects of personal business including scheduling, purchasing supplies, and billing.
- Maintained and repaired all equipment when needed.
- Grew business by providing quality service and receiving referrals from customers.

### **SKILLS**

**Computer:** AutoCAD, Microsoft Office, build and troubleshoot computers.

**Technical:** Extensive carpentry work, welding, electrical wiring.

### **ACHIEVEMENTS AND ACTIVITIES**

Engineers' Council – Freshman Representative

Habitat for Humanity – contributed 50 hrs. to construction projects

## **Student Assignment: Mock-Interview Activity**

### Brainstorm:

1. What are some interview questions you should be prepared to answer? How will you answer them?
2. What should you expect for an office interview versus a lab interview? (Clothing, professionalism, etc.)
3. What is proper attire? Are you expected to wear a suit? Are jeans ok?
4. What will you do if you show up for your meeting/interview and the professor has forgotten he was supposed to meet with you?
5. What are some questions you should come prepared with?
6. How will you approach the subject of pay vs volunteering vs credit?

### Questions:

#### **Standard:**

1. What brought you here - or why are you interested in this area of research?
2. Do you plan on working during the academic year or are you looking for a summer position?
3. Do you think you are more interested in running models and/or programming or do you like to get out into the field and/or work with instruments?
4. How do you schedule your time and balance classes with other activities that you are involved with?
5. Any thoughts about what you want to do when you graduate?
6. How many hours a week do you think you can work, and what classes are you taking?
7. People in my group have to be pretty independent. Give me an example of a time you had to solve a problem at work without checking with your boss.

#### **Curveballs:**

8. What was the worst job you had?
9. Tell me about something you had to make with your hands.
10. What would you do if you find out a fellow researcher/ co-worker is falsifying data?

11. You make a commitment to get a project done and you don't get it done in time, what would you do?
12. If you were shrunk to the size of a pencil and put in a blender, how would you get out? -- Goldman Sachs
13. You have a bouquet of flowers. All but two are roses, all but two are daisies, and all but two are tulips. How many flowers do you have? -- Epic Systems
14. If you could be any superhero which would you be and why? - AT&T
15. How many millimeters are in a cubic centimeter?
16. What is the difference between enthalpy and entropy?
17. If someone wrote a book about your life, what would be the title?
18. If you won \$100 million in the lottery, what would you do?
19. If you were an animal, what kind of animal would you be and why?

## **Student Assignment: Mentor/Student Relationship Case Studies**

### Case Study #1

You have been working on a research project for a while now. Your faculty mentor never seems to answer your emails, or return your calls. When you do make contact with them they provide short, nonspecific answers to your questions. What should you do to increase communication?

### Case Study #2

After working for nearly a year on a research project with your mentor, the results of the research are about to be published. Your professor assured you that your name would be included in the publication, but when it arrives it is not there. How should you react?

### Case Study #3

You have chosen a faculty member that shares the same area of interest as you; however, the professor's first language is not the same as yours and there are often miscommunications as a result. How can this situation be helped?

### Case Study #4

You have just started your research project with your faculty mentor. In the first week alone they have given you more than 45 hours of work. You have many other obligations aside from this research project. What can be done to improve the situation?

## **II. Basic Research Skills and Research Etiquette**

**Description:** This module is a discovery of “what is research” in various disciplines. Students will discuss the scientific method and how it applies to conducting research. They will participate in activities to express best practices and must-know information on how to be successful in a research setting.

**Learning Objectives:** To understand the scientific method, adapt the various ways to find a mentor, understand professional behavior, and become educated on lab notebook/lab safety practices (STEM).

**Assignments and Activities:**

- I. What is Science and Academic Research?
- II. Profile Potential Faculty Mentors
- III. Site Visit Reflection
- IV. Laboratory Notebook Activity

## **Student Assignment: What is Science and Academic Research?**

Ask your students which of the following are “research” and which are “not research.” Once the students have identified what “is” and “is not” research, ask them to explain their answers. Underlying their responses are their current understandings and definitions of “research.”

1. Asking someone out because your horoscope said so.
2. Creating a series of tests to see if the dog is smarter than your brother.
3. Comparing the fashion of the First Ladies to administration policies on equality.
4. Solving a difficult math problem.
5. Studying how the state of popular music reflects the values of a society at a given point in time.
6. Using a “rank-and-yank” system in a company that awards the top scoring employees and fires those on the bottom.
7. Conducting the “Pepsi Challenge.”
8. Testing the effects of mini “control burns” in preventing forest fires.
9. Adding random growth factors to your cell medium because you think it might help the cells grow better.
10. Criticizing the work of literary critics.
11. Learning about the fabrics used during the 12<sup>th</sup> Century for costume production for a modern-day theater performance.
12. The surveys given out by people at the mall.
13. Reading your economics book.
14. Playing a song on the piano.
15. Listening to pieces by composers from the 1800s in order to determine if there are any relevant patterns in the music.

Allow the students to explore research in differing disciplines. Pair up your students and assign each pair an area (Social Sciences, Arts & Humanities, etc.), and have them locate and summarize a project they find most interesting from that area. Afterwards, come together and discuss the research projects that each pair has identified. Does this change the previous definition of research?

After examining research from within and outside their area, challenge students to integrate this information in order develop a general definition of research.

RESEARCH IN MY DISCIPLINE	RESEARCH IN OTHER DISCIPLINES
NOTES:	RESEARCH AREA ASSIGNED:  RESEARCH PROJECTS CHOSEN:
RESEARCH (DEFINE):	SUMMARY OF THIS AREA OF RESEARCH:
RESEARCH IN GENERAL	
NOTES:  RESEARCH (DEFINE):	

## **Student Assignment: Profiling Potential Faculty Mentors**

To improve your chances of obtaining a research position, you should impress upon a potential faculty mentor that you are aware/understand their research program and feel that your interests coincide. Your assignment is to find **two** faculty members who you would be interested in working with. Find their biographies on the respective department website (i.e. Department of Chemistry, Department of Electrical Engineering, etc.) and fill out the following information. Do not copy and paste material from their websites directly. Use your own words to describe their work.

### Faculty Member 1

- Faculty Member Name:
- Department:
- Email:
- Lab Location:
- Office Location (if different than lab):
- Received Ph.D. from:
- Cite one article that would be useful to read if you were going to contact this faculty member and describe why it would be useful. (1 citation and 2-3 sentence explanation)
- Summary of faculty member's research interests (2-3 sentences):
- Write one question you have about the faculty member's research (1-2 sentences):

### Faculty Member 2

- Faculty Member Name:
- Department:
- Email:
- Lab Location:
- Office Location (if different than lab):
- Received Ph.D. from:
- Cite one article that would be useful to read if you were going to contact this faculty member and describe why it would be useful. (1 citation and 2-3 sentence explanation)
- Summary of faculty member's research interests (2-3 sentences):
- Write one question you have about the faculty member's research (1-2 sentences):

## **Student Assignment: Site Visit Reflection**

Site Visit Name/Location: \_\_\_\_\_

Site Visit Graduate Student/Faculty/Researcher Name: \_\_\_\_\_

### **Part I.**

List two questions to possibly ask during the site visits. (To be done BEFORE the site visits)

1. \_\_\_\_\_
2. \_\_\_\_\_

### **Part II.**

Select **one** site visit and answer the questions below. Make sure to **pay attention** to the presentation to answer the majority of these questions and if one is not answered either you or another member of your group can ask that question.

3. Site Visit Name:  
\_\_\_\_\_
4. Are there currently undergraduates working with this research group and/ or faculty member?  
\_\_\_\_\_
5. Write a 2-3 sentence description of what type of research this research group does.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. What is the answer to one of your questions from part I? Yes or No answers should be expanded.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. What is one thing you wish you understood better about the research reviewed during this visit?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## **Student Assignment: Laboratory Notebook**

### Background:

This assignment is designed to develop good laboratory skills, as well as introduce students to topics related to data management and data collection. This assignment provides the student with an opportunity to practice recording data in a laboratory notebook, and develop communication skills while working within a group.

Your notebook should follow proper guidelines:

- All entries made in pen
- All entries dated
- Topic or header with complete documentation of activities
- Signature of initials if errors are corrected

### Assignment:

For this assignment, you will be placed in a group of 3 to 5.

The objective of this assignment is to determine the number of red cars that pass a certain point on campus during a 24-hour period. You will be provided a logbook to record data and methods. The logbook should be complete and include all information as discussed in class. The last page of your logbook should include the answer to the question, along with all assumptions you made in order to achieve that answer. Please turn in your logbook (in class as a group) and each person should submit a short paragraph describing the following:

- 1) What were the group dynamics? How did your team work with each other?
- 2) In hindsight, were there things your group could have done better?

### **III. Finding and Using Literature**

**Description:** This module stresses the importance of literature and peer review in research. Understanding the different ways literature is used and implemented will help students both in their academic studies and in a research setting.

**Learning Objectives:** Students will understand components of literature (abstract, methods, etc.), will know how to detect primary resources vs. Wikipedia, will be able to analyze and write a literature review, and will become familiar with library resources.

#### **Assignments and Activities:**

- I. Library Activity
- II. Four Degrees of Separation Activity
- III. Reading and Analyzing a Literature Review
- IV. Writing an Abstract
- V. Super Outline and Writing a Literature Review

## Student Assignment: Library Scavenger Hunt

1. Provide a citation for a **primary** source about “managing water resources” in APA format:
2. What aspects about this source make it a **primary** source?
3. Provide a citation for a **secondary** source about “cholera” in APA format:
4. What aspects about this source make it a **secondary** source?
5. What is the name of the article in \_\_\_\_\_ *Journal* published by \_\_\_\_\_ in year \_\_\_\_?
6. Using a database, search for articles by \_\_\_\_\_. How many articles did you find?
7. Find \_\_\_\_\_ faculty website at \_\_\_\_\_. What kind of research does he/she perform? What keywords could be used to refine the search for articles by \_\_\_\_\_?
  - 
  - 
  -
8. Use one or more keywords from question 5 and retry the search. How many did you find?
9. Now limit your search from question 6 to the last six years. How many did you find?
10. Provide citations for two **primary** sources about your literature review topic in APA format:
  - 
  -
11. Provide a citation for one **secondary** source about your literature review topic in APA format:
  -

## **Student Assignment: Four Degrees of Separation**

### Background:

This assignment aims to improve your skills at searching for literature in the library on research projects. It's designed as an electronic scavenger hunt. You will be given a starting paper and asked to find references and citations starting with this paper. The goal is to obtain the highest score based on references and citations.

### Assignment:

Start with the following article, we will refer to this as our **base article**:

Title: A multiscale model of plasticity

Author(s): Zbib, HM; de la Rubia, TD

Source: INTERNATIONAL JOURNAL OF PLASTICITY Volume: 18 Issue: 9 Pages: 1133-

1163 Article Number: PII S0749-6419(01)00044-4 DOI: 10.1016/S0749-6419(01)00044-

4 Published: 2002

Now, using up to 4 steps, go backwards (in time) and find a reference of a reference of a reference (etc.) of this paper. Your points will be calculated by Total points = Step number \* years in the step.

For example, you are starting with a paper that is published in 2002. You identify a reference in that paper. For example, say the first reference you choose is published in 2000. You would have step number (1) \* years in the step (2) for a total of 2 points. Now using the new paper you just identified, find a reference in that paper that is older than 2000, in this case. Repeat this for a total of 4 steps. When you are done you should have a list of 4 references that are all published prior to 2002.

Next you will work on going forward in time. Starting with your base article (the one published in 2002), find a paper that cites the base article. For example, assume you found an article published in 2005. Your points will be calculated by Total points = Step number (1) \* years in step (3) for a total of 3 points. Next, find an article that cites the article that was published in 2005. This would be for step 2. Repeat this for a total of 4 steps. If you find an article that is published this year, then the points for that step is step number \* (12-months ago) from today.

Upload your sequence of papers in proper format (with authors, titles, journal, years, and pages) for both forward and backwards, and provide your scoring on the upload. Just upload a text file, you do not need to upload the actual papers.

Scoring and Submission example:

**Base article published in 2002**

References:

Step 1: Smith et al., 2000 Journal name, volume, issue, page numbers and url

Step 2: Jones et al., 1995 Journal name, volume, issue, page numbers and url

Step 3: Leif et al., 1980 Journal name, volume, issue, page numbers and url

Step 4: Gordon et al., 1964 Journal name, volume, issue, page numbers and url

References total score =  $(1*2) + (2*5) + (3* 15) + (4 * 16) = 121$  points

Citations:

Step 1: Smith et al., 2003 Journal name, volume, issue, page numbers and url

Step 2: Jones et al., 2004 Journal name, volume, issue, page numbers and url

Step 3: Wright et al., 2010 Journal name, volume, issue, page numbers and url

Step 4: Harvey et al., 2016 (June) Journal name, volume, issue, page numbers and url

Citation total score =  $(1*1) + (2*1) + (3* 6) + (4 * 6) = 45$  points

Total Score = References score + citation score =  $121 + 45$

**Grand Total = 166 points**

## **Student Assignment: Reading Literature**

**Objective:** Being able to dissect a research article is crucial to successful research in any setting. Knowing the breakdown of a journal article will make searching for what you need much easier. Often times, prepping for a research project includes reading many papers. In this assignment you will review your team's article. Then discuss the article with all the group members and answer the questions below.

1. APA citation for article:

Title:

Authors:

Year of Study:

Name of Journal:

2. List two important facts reviewed in the introduction:

- 
- 

3. What is/are the main research questions or objectives for this article? Do not restate the title.

4. Is there a hypothesis stated? If so, state the hypothesis. If not, why do you think no hypothesis is stated?

5. List three methodologies used for the research and briefly describe their purpose.

6. How are the results presented? Table, graphs, charts? Are they easy or difficult to understand?

7. List two results of the study:

- 
- 

8. List one conclusion of the work:

9. What implications or suggestions are offered for future research?

10. Has the work been funded by a specific source? If so, what are the sources of funding?

11. Why did your team select this article?

12. Why did your team select this article and was this paper at all relevant to your literature review topic? Explain.

## **Student Assignment: Writing an Abstract**

**Objective:** Based on your understanding of abstract writing, create your own abstract for an assigned discipline-specific research article.

**Read Article:** To begin, follow the link and read the article: *Art of Reading a Journal Article: Methodically and Effectively* (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3687192/>). An important research skill to possess is the ability to comprehend and locate important points in research articles. Locate a research article associated within your discipline and carefully read over the information. Along the way, make a list of the main points in the article. Pay special attention to information regarding the articles rationale or background, objective, methodology, results, and conclusion.

**Create an Abstract for the Assigned Article:** Each research article generally contains an abstract, which serves as a brief summary of the article's main points. In the research environment, you may eventually be tasked with writing some of these abstracts. Integrating the summarized information, create an appropriate abstract for your assigned article. This abstract should be between 200 and 250 words; include a word count in your assignment submission. In addition, this abstract must be written in your own words; copying and pasting information directly from the article would be considered academic plagiarism and will result in a 0.

## Student Assignment: Super Outline

You now should have chosen a topic for your literature review. Reminder: the review requires a minimum of 5 references with at least 3 coming from primary literature and has a word count of 500-750 words (not including citations). You will cite a reference(s) as you refer to them (in-text citations) using the format conventional for your discipline.

The next step is what we call a ***super outline***:

Outlining, like flowcharts for programming, is becoming a lost art. Unlike flowcharts, however, outlining has not been replaced by superior approaches. Through proper outlining, a document essentially writes itself, resulting in a concise, logical, and compelling narrative.

The method described herein was invented independently by Dr. Lusth, but he has found subsequently that bits and pieces of his approach have been suggested before. In essence, writing a paper ought to be much like writing a program using *stepwise refinement* [1]. With stepwise refinement, one starts out by defining a main function; the main function simply calls a series of subfunctions which do not yet exist. The *step* in stepwise refinement is to define these subfunctions, which, in turn, may call other functions that may or may not yet exist. The process ends when all functions are defined.

The *main* function of a program looks much like the outline of a paper, with the sections of the paper corresponding to the subfunctions the main function calls. Thus, it should be possible to apply the technique of stepwise refinement to writing a paper, should one start with an outline. When stepwise refinement is applied to an outline, each section heading of the outline is expanded to a short description. The description is then expanded to a series of paragraph topics. The topics are, in turn, expanded to partial paragraphs. Finally, the partial paragraphs are expanded to complete paragraphs. We refer to the combination of outlining and stepwise refinement, *super outlining*. Because of the individual steps taken during the process, super outlining leads to coherent documents that flow well.

The initial phase of the super-outlining method is to map out the overall structure of the document, down to the subsection level. For a research paper documenting an experiment, the initial outline might look like this (section names may vary between disciplines):

- Introduction
- Background
- Experimental Procedures
- Results and Analysis
- Conclusions

For your final project, you will write a literature review, or essentially the *Background* section of a research paper. This review might have the following top-level sections (**Phase I**):

- Introduction
- Early work
- Seminal discoveries

- Refinements
- Remaining Challenges

## **Phase II**

Write descriptions for each section. What issues do you want addressed? Once you have given this thought, it becomes a simple matter to expand the outline further. During Phase II, it is common to return to Phase I and modify the section descriptions. In fact, it would be rather unusual *not* to do so.

## **Phase III**

In Phase III, each paragraph topic is augmented with the introductory and closing sentences of the paragraph. This will further cement the ‘flow’ of the document; care should be taken that the closing sentence of a paragraph should serve as a transition to the next paragraph, if appropriate. Indeed, after adding these bracketing sentences, one should be able to read the entire document as a coherent whole.

## **Other considerations**

Any document intended to be widely read should tell a story. Another rule the successful writer should use, if possible, is the Rule of Three. The *Rule of Three* states that any complex idea, thought, or approach, should be broken down into three components. If any of the components is still too complex to be described succinctly, it too should be broken down into three subcomponents, and so on. Resist the attempt to use four or more subcomponents.

Lastly, in the final editing of the document, a critical eye is placed on each paragraph, each sentence and on each word of the document. Each item should only be present if it contributes in an original way to the overall story told by the document; otherwise, it should be removed. Typically, via super-outlining, each paragraph is serving a purpose, but often sentences repeat information or are awkward and inelegant.

Questions to ask are:

- Does this sentence repeat information that has already been stated?
- If not, is the sentence absolutely necessary for purpose of the paragraph?
- Is each word absolutely necessary for the purpose of the sentence? In other words, can the sentence be shortened but still retain its meaning?

By looking critically at the word and sentence level, a document can both be shortened and become more elegantly written. A big draw of super-outlining depends on the theory that spending more time up front organizing your thoughts will reduce the overall time writing the full paper.

Reference:

[1] The original idea, by Niklaus Wirth, can be found: <http://sunnyday.mit.edu/16.355/wirth-refinement.html>

## **Student Assignment: Writing a Literature Review**

**Objective:** A literature review is a scholarly document that reviews the breadth and depth of literature on a topic in order to determine what is known. The review combines summary and synthesis of research findings. The main purpose is to help you explain how the research topic fits into the larger picture. For this assignment, you will synthesize your own literature review.

### **Overview**

Create a 600-800 word literature review on a STEM research topic. It should be typed, double spaced, 12 point font, and will be submitted through [www.turnitin.com](http://www.turnitin.com) for peer review. The following aspects should be included in the document:

- List faculty who inspired topic
- Clear and specific title
- Separate citation list in APA format
- 7 sources are required, 5 must be primary
- Introduction, body and conclusion

The literature review should address the following:

- What is known about the topic you're studying? What is the current status of research in this area?
- How does one scientific study relate to others in this area? Are there any apparent strengths or deficiencies; perhaps in terms of methodology or the conclusions drawn?
- Are there any gaps in the knowledge of the subject?

### **Stages of Writing a Literature Review**

- 1) *Problem formulation:* Determine the topic being examined. This stage should be complete.
- 2) *Literature search:* Find materials relevant to the subject being explored. If the articles you used for past assignments are helpful, you may use them as long as they are from appropriate databases.
  - Do a quick scan of your reading to get a feel for what's known and for how you might organize your lit review. Then start a more in-depth read. In some way, shape, or form you need to make sense of the research you're reading and make it helpful to you as you write.
- 3) *Data evaluation: Assess and evaluate the literature, don't just summarize it.* A literature review doesn't just report on what the research says, but it critically analyzes that literature. Analyze the data to help the reader understand and make meaning out of it.
- 4) *Analysis and interpretation* - Discuss the findings and conclusions of pertinent literature. **What ideas and subtopics that come together to explain the larger topic?** What are the

reoccurring themes from the studies? After your analysis, put the material into a coherent whole. How did the findings advance the field?

- 5) *Citing sources* - You must have in-text citations and a separate citation list in APA format. Review articles are *secondary* articles. Citations of sources must be used whenever you give a fact. When in doubt, cite.
- Do not quote. In science, the **primary support comes from presentation of the authors' data, not of their words.**

### Literature Review Do's

- Include enough information to describe the research topic
- Stay focused on the research topic and don't include irrelevant information
- Define and explain all technical terms and acronyms (writing for general STEM audience)
- Paraphrase, no quotations
- Include title, in-text citations, works cited, and a word count

### Literature Review Rubric (40 points total)

1. Lit review (**36 total**)
  - Appropriate and specific STEM title/topic **1 point**
  - Introduction
    - i. Establishes field of topic briefly and also establishes importance **3 points**
  - Body
    - i. Uses in-text citations of sources in consistent format **1 points**
    - ii. Discusses each source (in student's own words) **4 points**
    - iii. Logical discussion with strong transitions between main ideas **10 points**
  - Conclusion
    - i. Only includes conclusions that are justified by literature **3 points**
    - ii. Describes specific parameters or gaps that could be studied **4 points**
  - Appropriate length and correct spelling, grammar, punctuation **2 points**
  - Improvements **8 points**
1. Citations (**4 total**)
  - Has a citation section with at least 4 citations (3 are primary) **2 points**
  - Use of credible sources (i.e. Wikipedia vs. peer reviewed journal) **1 points**
  - Correct and consistent format for citations **1 point**

## **IV. Dissemination: Technical Writing, Posters, and Presentations**

**Description:** An often overlooked aspect of research by students is communication; whether it be orally, via poster, or proposal writing. This module expresses the importance of communication and explains when each is appropriate.

**Learning objectives:** Students will understand components of a research poster (background, methods, results, etc.), and how to create and present one. They will become knowledgeable of opportunities for presentation available to them and become familiar with various ways to communicate research.

### **Assignments and Activities:**

- I. Grant Proposal Activity
- II. Attending Seminars
- III. Critiquing a Poster and Researcher Interview
- IV. Student Research Showcase (SRA) Interview
- V. Creating a Poster

## **Student Assignment: Grant Proposal Activity**

Many organizations fund research, development, or other project proposals from public tax dollars. Grant management professionals want assurance that those proposals are feasible and have merit. Today you are the reviewer at a funding agency. After reading the proposal, complete questions 1-7 on your own. Then discuss 8-12 with your panel.

1. Describe how the project will contribute to the field based on what the author discussed.
2. How will the author's data be generated, obtained, and analyzed?
3. What controls or measures to reduce error does the author mention and how do they work to reduce error? If there are none, what controls could the author include?
4. Are there any diagrams or figures and if so, did they increase your understanding of the project? What kind of diagrams or figures would you recommend, if any?
5. Which previously used methods does the author cite in the methods section? Explain if you are convinced the proposal is feasible based on the studies cited.
6. Are there any confusing parts in the methods or expected results?

### **YOUR RANKING**

7. **Preliminary score** (circle/bold one):   Excellent   Very Good   Good   Fair   Poor

### **PANEL RANKING**

8. **Overall score** (circle/bold one):   Excellent   Very Good   Good   Fair   Poor
9. **Decision regarding funding** (circle/bold one):   Fund   Fund if possible   Do not fund
10. Did your score change after meeting with the panel? If so, explain (it's okay to change your score).
11. Are there any aspects you had not thought of before discussing the proposal with the panel?   Did the panel disagree about any particular aspect of the proposal?
12. Why should or shouldn't this proposal be funded?

## Sample Proposal: Biology

### Measurement and analysis of animal diversity among the *Crassostrea virginica* oyster reef

#### Research Objective:

To measure the diversity of animal species among the *Crassostrea virginica* oyster reefs (made by the implementation of oyster mats) and analyze which species are beneficial and/or detrimental to their survival and promote their conservation among commercial fishermen.

#### Literature review:

The *C. virginica* oyster is a species native to north America and the gulf of Mexico. They are known for their complex three dimensional mounds, which are formed when larvae settle on older established shells and continue to stack on top of each other. The tightly clustered shells of the oyster mound provide the essential shelter for mollusks, crustaceans, juvenile fish and resident invertebrates (Grabowski, 2012). The colonization of oyster reefs with these associated species can be both positive and negative for the *C. virginica* oyster. A positive effect is that their settlement amongst the oyster reef creates a highly profitable area for commercial fishermen. The knowledge that oyster reefs increase crab and fish settlement could convince fishermen that the oyster reef is worth preserving. A negative aspect is that they compete with the oyster for floating plankton and algae, sometimes preying on the oyster itself (Lenihan & Peterson, 2004).

The mud crab, blue crab and stone crab have proven to be predators of the *C. Virginica* oyster (Grabowski, 2004). Not only do these crabs prey on fish hatchlings that seek refuge in the dense oyster mound, but also on newly settled oyster larvae. They are highly resistant to factors such as temperature, salinity and exposure to air (Rindone, 2011). Another predator, the southern oyster drill, bores holes in the shells of its prey and then ingests their soft internal body. This not only leads to oyster death but greatly affects the settlement of oyster larvae because studies have shown there is reduced settlement on porous shells (Watanabe, 2006).

In recent studies, barnacles have shown to cause no direct harm to oyster reefs (Barnes, 2010). Interestingly, certain byproducts of barnacle metabolism are actually shown to increase oyster settlement adding to the scent which attracts larvae to pre-formed reefs (Barnes, 2010). During the feeding ritual of an adult barnacle a vacuum is formed and water along with oyster larvae is ingested (Barnes, 2010). Subsequently, oyster larvae were released from the barnacle relatively unharmed (Barnes, 2010). The only damage caused by barnacles to oyster reefs is through over-colonization. If too many barnacles crowd the oyster reef, it prevents new larvae from settling and increases competition for floating algae.

These various inhabitants of the oyster reef are all considered as valuable stock items for local fisherman, especially the stone crab, blue crab and economically important fish species. These merchants use dredging machines that scrape the bottom of the aquatic habitat breaking apart the inner-workings of the mound and reducing its height by more than 34% (Lenihan & Peterson, 2004). The machine captures both the *C. virginica* oyster reef and the animal populations that live inside of it.

Oyster larvae are attracted to oyster shells, so dredging can prevent natural recovery because it removes the shell attracting larval settlement disrupting an oyster habitat that may take years to restore itself (Lenihan & Peterson, 2004). Hand-harvesting these species actually increases yield per unit of time, but fishermen continue doing this because dredging machines

are relatively easy to operate and only take one person, whereas, hand-harvesting takes many divers and is more strenuous (Lenihan & Peterson, 2004). If conservationists could increase awareness of the diversity of species attracted to the reef habitat and their potential monetary gains through safer handling of the reef, fishermen may join in the efforts to save the oyster reef.

In an attempt to restore these reefs and increase awareness about oyster reef populations it is important to determine the diversity of aquatic animal species that are both detrimental and beneficial to the oyster reef. Few surveys have been conducted examining the variation in animal species that thrive in the oyster haven. This information is of tremendous value because it will potentially stabilize, if not, decrease oyster mortality and lead to an increase in oyster recruitment. Also, it will show fishermen the benefits of maintaining the *C. virginia* oyster reefs.

## Methods

My experiment involves two parts: testing the biodiversity living among the oyster reef and assessing the change in attitude fishermen have towards conservation of the oyster reef. Our study will take place in Mosquito Lagoon in New Smyrna Beach. For part one of the experiment, 10 living oyster reefs with a radius of 5-km will be selected (Barber, 2010). First, a lift net with a circumference at least 1" larger than the circumference of the oyster reef will be placed completely over each oyster mound to catch crab and other mobile animals (Barber, 2010). To make sure that oyster larvae and smaller organisms pass through the net, holes of the lift net will be proportional to the size of oyster larvae but small enough to prevent the passage of larger animals such as crabs. Naturally, crabs, barnacles, fish and other aquatic life will be drawn to the oyster reef and thus settle onto the mat. The second step would be to record the names of mobile aquatic animals, monthly. Then data will be copied onto an Excel spread sheet. Throughout the year, data will be recorded to make sure that an accurate representation of animal species is documented and that seasonal change is not a compounding variable (Barber, 2010). After a year, the third step would be to compile the sum of data into a concise list avoiding repetitions of the same species. On the chart in which data is recorded, there will be a section titled beneficial or detrimental to the oyster reef. Past journal articles will be used to list whether each species helps or harms the oyster reef.

If results are positive from the first experiment, the second part of the experiment will entail making a poster board to present the variety of economically-important species drawn to the oyster reef habitat. Every day for a month a lab representative will conduct a survey involving local fishermen at mosquito lagoon. A yes-or-no survey concerning attitudes towards oyster conservation will be handed out to fishermen and recorded. Then, the same Fishermen will be encouraged to listen to a short presentation of the research conducted, specifically regarding the diversity of economically important species that the oyster reef facilitates. Upon departure, they will be asked to complete the survey again. Results for both surveys will be recorded in Microsoft Excel. The following will be calculated: averages and percent change in responses before and after the presentation-survey.

## Expected outcomes

I expect there to be an even distribution of blue crab, flounder, shrimp, snails, and toad fish of maturity in the oyster reefs in New Smyrna Beach. Past studies focusing on predation have found stone crabs, blue crabs and mud crabs (Rindone, 2011). Also the oyster drill (Watanabe, 2006) and barnacle (Barns, 2010) have been documented. When presented with charts detailing the variety of animal species that thrive in the oyster reef, I do expect the views

of local fishermen to change. A major factor in the depletion of the oyster reef is the choice harvesting techniques of fishermen. If fishermen realize that the depletion of oyster reefs will inevitably lead to a decrease in certain crab and fish species that are highly profitable, they will consider using more delicate methods to excavate the reef. With future educational programs and presentations, I think that they will change their behaviors and become more focused on conservation.

Budget	Item	Price
	12 lift nets	\$240
	Gas/Travel	\$600
	Animal diversity poster	\$100
	Total	\$940

### Timeline

August 2013-July 2014: Collect species diversity

August 2014: Present data to local fishermen

September 2014: Pool data and run tests.

### References:

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## **Student Assignment: Attending a Research Seminar**

**Objective:** In order to narrow your research interests, it is helpful to begin familiarizing yourself with current topics in science. Scientific discoveries are also frequently disseminated through “research seminars.” Such seminars may be given at annual scientific meetings, where scientists of similar interest convene to discuss and present the latest findings in that field. Another form is invited talks, where universities invite well-known researchers to their departments to present and discuss their work. Your assignment is to attend 3 of these seminars of your choice. Please obtain the signature of either the presenter or host after the seminar has concluded, you also need to write a short paragraph summarizing each seminar you attended and what you learned. This will be turned in at the end of semester.

### **STEM research/seminar presentations**

- Event needs to be based in the STEM disciplines (also try interdisciplinary fields!)
- Check the department websites for the most up to date information.
- If you are not sure if the event qualifies for one of the research seminar presentations, contact the instructor.

### **Events that usually qualify as STEM research/seminar presentations:**

- Faculty seminars.
- Faculty candidate seminars.
- Graduate student defenses (theses or dissertations).

### **Events that usually DO NOT qualify but can be beneficial to your academic growth:**

- Workshops offered through offices on campus (Career Services, Undergraduate Research).
- Honors College defenses (some are very short).
- Off-campus research presentations.

### **Etiquette:**

- Do not show up late or leave before the presentation is over.
- Questions are usually held at the end of the seminar.
- Obtain the signature of the presenter or host after the presentation and Q&A session is complete.
- Do not use cell phones during the seminars, but you may take notes on the presentation.

## **Student Assignment: Critiquing a Poster and Researcher Interview**

**Background:** Posters are presented at various symposiums, conferences and showcases all over the world. Scientists gather to discuss trending research and share their work. Your task is to attend a showcase/conference/symposium available to you in the area or on campus and complete the following two assignments.

### Poster:

1. List (in proper format) the reference for this poster. Or – in other words, how would you list this poster on your resume if it was your poster?
2. Provide a list of three specific “things” that were well done on this poster (and why).
3. Provide a list of three specific “things” that were NOT well done on this poster (and why).
4. Were there any items that were missing from the poster that should have been included?

### Interview:

- Select four researchers to speak with at a research showcase/conference/symposium that is available to you.
  - Two of the researchers have to work in your STEM discipline.
  - One of the researchers has to work in a different STEM discipline.
  - One of the researchers has to work in the non-STEM discipline.
- Write down the presenter’s name, the field they conduct their research in, and his/her project title.
- Ask the presenter two questions about their research.
  - What is your project about?
  - How did you choose your topic?
  - What is one result you found?
  - How long did it take you to do this project?
- Responses
  - Write down responses *after* your conversation.
  - Questions can be general or specific, as long as they are about their research.
  - Each question in the *entire* assignment that you develop must be unique.
  - Questions should be well-thought-out. The following are examples of redundant/superficial questions that do *not* count towards the assignment

## **Student Assignment: Student Research Showcase (SRA) Assignment**

**SRA Student Name:**

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Ask three student presenters to tell you about their research.

- **Then ask two questions about each student's research project.**
  - Questions can be general or specific, as long as they are about their research.
  - Every question in the *entire* assignment must be different and well-thought-out.
- Write down the responses (20-40 words each) *after* your conversation.

**Student Presenter #1 Name:**

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**Student Presenter #1 Field of Study:**

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**Question #1:**

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**Answer #1:**

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**Question #2:**

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**Answer #2:**

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**Student Presenter #2 Name:** \_\_\_\_\_

**Student Presenter #2 Field of Study:**

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**Question #1:**

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**Answer #1:**

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**Question #2:**

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**Answer #2:**

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**Student Presenter #3 Name:** \_\_\_\_\_

**Student Presenter #3 Field of Study:**

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**Question #1:**

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**Answer #1:**

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**Question #2:**

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**Answer #2:**

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## **Student Assignment: Creating a Poster**

- Get in groups of 3-4
- Pick a general question to research for about 1 hour on campus
  - You may choose a sample question provided below or you may choose a new question
  - **Each group must get approval on their question before researching it**
- Collect data to answer your question
  - Use resources within your means
- Record methods and results
- You will create a poster with your results and present

### **Sample Research Questions:**

- How many orientation students wear \_\_\_\_ apparel?
- What is the distribution of squirrels on campus?
- How many people hold the door for others?
- How many people use Facebook on library computers?
- How many people go to the library café but don't use the library?
- How many people smoke on campus?
- How many people buy something other than a textbook in the bookstore?
- How many people buy food at \_\_\_\_?
- How many people use the arcade at \_\_\_\_?
- How many people walk on the grass instead of using sidewalks?
- How many people use the elevator to go downstairs in the \_\_\_\_ building?

## **V. Intellectual Property, Technology Transfer, and Ethics**

**Description:** The idea behind this module is to familiarize students with the more technical side of research. Knowing how research is patented is crucial when making important discoveries. Providing information about these behind-the-scenes aspects will arm students with information on how to deal with technicalities and issues that may arise.

**Learning objectives:** Students will understand differences between patents, copyrights, and trademarks. They will become familiar with authorship practices, the importance of peer review, and various ethical issues and how to handle them.

### **Assignments and Activities:**

- I. Ethics Case Studies
- II. Mentor/Student Relationship Case studies
- III. Technology Transfer Seminar

## **Student Assignment: Ethics in Science**

**Objective:** Read each case below and answer the following questions. Each answer should be well thought out. Credit will not be given for incomplete or superficial answers.

### **Case Study 1A**

May is writing a literature review article to serve as the basis for her Honors in the Major thesis. In her paper, she incorporates whole sentences and paragraphs verbatim from several published papers. She does not use quotation marks, but the sources are suggested by statements like “(see...for more details)”. May’s faculty mentor notes inconsistencies in the writing styles of different paragraphs and checks the sources, uncovering May’s plagiarism. After discussion with other faculty, May’s plagiarism is brought to the attention of the Director in charge of the Honors in the Major program who confirms that plagiarism is specifically prohibited. The Director dismisses May from the program.

### **Case Study 1B**

One day in class, Alex has a cutting-edge idea for a research project. Alex begins organizing his thoughts into a paper for publication, which he submits to a faculty member at his university who is an expert in the area of Alex’s interest. The faculty member adamantly rejects the proposal, stating that Alex’s ideas are plagiarized from another author. Alex contends his work is original but when Dr. Bickel presents him with current literature in the field, Alex exclaims, “I’ve read those!” Then he realizes that through his literature review his idea was inspired by those other papers.

- Compare/contrast the above cases. Explain punishment, if any, the student should receive.
- How can you prevent plagiarism? Where can students learn about proper citations?

### **Case Study 2 – Weapons Research at a University (Adapted from the film *Real Genius*)**

Mitch began working on a research project as a freshman to develop a high-powered laser. After months of dedicated research, he devised a system that exceeded the minimum wattage described in the project goals. After submitting his design to his professor, Dr. Hathaway, a senior student in the lab, Chris, told Mitch that his laser design was being used to create a high-powered weapon for the military. Mitch later asked Dr. Hathaway about this, who confirmed that it was a military-funded project. Mitch was then upset that he had unknowingly helped to create a potential weapon.

- Is it an undergraduate’s responsibility to know the broader implications of his/her research?
- What should Mitch do, if anything? How could that action or inaction affect his career?
- Do you think it is ethical to conduct weapons development research in a university lab? Explain.

### **Case Study 3 – Biotechnology Research Used by the Military (*based on a true story*)**

Arthur Galston's Ph.D. research examined the effects of a chemical, triiodobenzoic acid ("TIBA"), on the yield of soybean plants. He found that by adding low concentrations of TIBA he was able to greatly increase plant productivity but that it was also possible to give too much of a good thing – at higher doses the plants shed their flower buds and leaves prematurely, resulting in decreased plant yield. After obtaining his Ph.D., Galston moved into a different area of research in plant physiology. Eventually, his Ph.D. research led to the use of TIBA as an agricultural tool, increasing soybean yields up to 30%. Galston later learned that the compound was being studied by the U.S. military for possible use as a defoliant.

Time passed and a war erupted. The U.S. military began using TIBA to defoliate the enemy's countryside to expose hidden trails. Galston knew that food crops as well as forests would be defoliated, and thus famine was likely to occur. Moreover, the long-term impacts on other aspects of the environment, livestock, and even human health were unknown. Galston was very concerned. Although he was no longer engaged in research on TIBA, Galston felt some special responsibility for this turn of events.

- Is it okay to withhold results from the scientific community if they could have detrimental effects on society?
- What, if anything, should Galston do? How might that action or inaction impact his career?

### **Case Study 4 – Authorship**

Juan has been working in a chemistry research lab for over a year and is now finishing a project. Juan has been the only one maintaining their modified plants and is about to extract chemicals grown in them. The project was overseen by a graduate student, Sam, who came up with the experiment and won a student research grant from the university to buy the planting materials used in the project. Sam is planning to teach Juan how to analyze data with the final chemical extracts from this experiment. All of this work was done with the help and resources of Dr. Jane Kimbo. Juan, Sam, and Dr. Kimbo have a meeting and decide to publish this project in a scientific journal with some supplementary data from one of Sam's other projects.

- List the order of the author(s) as they should appear in the published article and explain the placement for each author.
- Besides authorship on a publication, how can credit be given to contributors?
- Can you own an idea? Explain.

### **Case Study 5 – Use and Misuse of Data (Adapted from *On Being a Scientist: Responsible Conduct in Research*)**

Howard and Raj are conducting a research project to see how blood pH affects a parasite. After sampling three of their Petri dishes on March 20, they noticed the sensor on the pH meter was rusty. Raj cleaned the sensor, and they continued testing pH for the remaining five of their samples. When they began analyzing their data, they noticed that the pH values from March 20

were much lower for the first three samples than the rest of the samples from that day and the other sampling days. They recalled the rusty sensor and decided to drop those three values from that day's data before proceeding with the analysis. "These three values," Howard pointed out, "were obviously wrong."

- How should these data be handled? Should they eliminate these three data points?
- What resources are available to Howard and Raj in making these decisions?

**After reviewing the case studies as a group, answer the following questions. Credit will not be given for incomplete or superficial answers.**

1. What are three to four ethical issues covered in the case studies?
2. Synthesize a general statement addressing ethics in your discipline.
3. What are the implications these concerns might have on an undergraduate researcher?

## **VI. Additional Student Assignments and Activities PMSC**

### **Pre-Assignment**

#### **2017 Summer Research Academy Pre-Academy Assignment**

*Identifying UCF Faculty and Research, Professional Development, Research Strategies, and Proposal Evaluation*

**Due Date:**

**Point Value:** 18 points

**Format:** All parts will be submitted online. Hard copies of Part II and IV will ALSO be submitted to your Peer Mentor. All documents should be typed in 12-point font.

**Overview:**

**Part I: UCF Research Review.**

(a) Find and identify three UCF faculty researchers who have research projects that you find interesting. Summarize their research in the worksheet provided below (1 point).

(b) Choose one of the three faculty members' research projects you identified in Part I that you would like to learn more about. Devise a question related to his or her research. Write a 400-500 word essay about the topic of your question. Find two sources of information to help you write this essay. Please attach these sources to your assignment (copies are fine; 5 points).

**Part II: Professional Development.**

Draft a personal resume and professional email to a professor you would like to research with. In addition, please bring two hard-copies of your resume and email to the Summer Research Academy for review. (2 points).

**Part III: Proposal Evaluation.**

Read an undergraduate research proposal and discuss the merits of the project. Bring one hard-copy of your proposal evaluation to the Summer Research Academy for review. (5 points)

**Part IV: Research Strategies.**

Become familiarized with research strategies and take a 10 question quiz on this material. (4 points)

**Detailed Instructions:**

The following instructions should assist you in completing this assignment and hopefully answer most of your questions. If you have any questions about this assignment, please e-mail your Peer Mentor.

**Part I:** The overall objective of this exploratory assignment is for each SRA Scholar to find UCF faculty researchers on the University's website whose research projects are interesting. Once you have found several faculty researchers whose research interests match your interests, you must

write a 400-500 word summary about one question that arises from their research, as well as find information sources about the question. This question should be something you find interesting.

Part I (a)

1. Search for three UCF faculty members who are doing research that you find interesting.
  - These researchers do not have to be in your major but their projects should be related to your interests.
  - There are no right or wrong answers to this exercise. However, the people you choose will be used as discussion during SRA.
2. One way to look for these researchers is to go to a UCF department's home page and browse through the faculty list.
3. Then fill out Pre-Assignment Worksheet Part I a (page 3 of this document) and submit through Webcourses.

Example to help get you started on Part I:

You are a political science major who is interested in state and local politics. To find a faculty member with the same interests as you, search the UCF political science department's webpage (you can find any other department page by typing in the department name in the search box located in the upper right hand corner of www.ucf.edu). For Part I, provide the URL of the faculty member or researcher's webpage that displays their research interests or areas or fields of specialization. You may also get this information from the faculty member/researcher's Curriculum Vita/CV. Under the URL, state their research interest.

For example:

Dr. Jewett's areas of specialization include state and local politics, which are areas of research that I am interested in.

Part I (b):

1. Choose one of the three faculty members' research projects and come up with ONE question that relates to that work.
2. Find at **least two** sources to write a 400-500 word summary about a topic that falls under this research question.
3. For your short essay, please cite your sources. While there is no particular format required, provide an author name or title of webpage (if possible), title of the article/book/website, year (if available), and the URL if applicable.
4. The sources **must be either uploaded with your essay or link included in essay document**. If it is a website, include the link at the bottom of your essay. If it is a journal article, submit the PDF as an attachment

Part II:

Draft a one page resume of your current accomplishments and milestones. Then draft a 1-2 paragraph draft email to a professor you would like to work with. Bring two hard copies of both of these documents to the event.

Part III:

After reading the proposal that your peer mentor assigned you, complete questions 1-7. You will submit this assignment to Webcourses and you can leave answers to questions 8-12 blank. Print one hard copy of this assignment, bring it to the event, where you will then discuss 8-12 with your group.

**Part IV:**

The UCF library will post instructions on Webcourses on or before June 3 for completing the Library Research Strategies modules. You will be graded on the 10 question quiz at the end of the modules. Expect to spend 1-2 hours on this portion of the pre-assignment depending on your experience with library research skills.

**Pre-Assignment Part I (a) Worksheet**  
*Identifying UCF Faculty Researchers*

**Researcher 1 (e.g., UCF Faculty member):**

**URL 1:**

**Research Summary 1 (1-2 sentences):**

**Researcher 2:**

**URL 2:**

**Research Summary 2 (1-2 sentences):**

**Researcher 3:**

**URL 3:**

**Research Summary 3 (1-2 sentences):**

**Pre-Assignment Part I (b)**  
*Writing a Summary about a Research Topic*

**Pre-Assignment Part II (print two copies)**  
*Email Draft and Resume*

**To:** Insert faculty email address here

**From:** Insert your email address here

**Subject:** Insert subject here

Insert draft email content here and type resume on separate page

### **Pre-Assignment Part III (print one copy)**

#### *Proposal Evaluation*

1. Describe how the project will contribute to the field based on what the author discussed.
2. How will the author's evidence or data be obtained, analyzed?
3. Does this author's research design (methods) seem sound? If not, what are some issues in the design and how might they be improved?
4. Is it clear that this author has an understanding of their field? Have they made reference to other research on their topics (in methods, literature review, etc.)?
5. Are there any confusing parts in this proposal?

#### **YOUR EVALUATION**

6. **Preliminary score** (circle/bold one):   **Excellent**    Very Good    Good    Fair    Poor
- 

#### **PANEL RANKING (wait until the event to fill out the following)**

7. **Overall score** (circle one):   **Excellent**    Very Good    Good    Fair    Poor
8. **Decision regarding funding** (circle one):   Fund    Fund if possible              Do not fund
9. Did your score change after meeting with your group? If so, explain (it's okay to change your score).
10. Are there any aspects you had not thought of before discussing the proposal with your group? Did your group disagree about any particular aspect of the proposal?
11. Why should or shouldn't this proposal be funded?

### **Pre-Assignment Part IV**

#### *Research Strategies*

The UCF library will post instructions on Webcourses on or before June 3 for completing the Library Research Strategies modules. You will be graded on the 10 question quiz at the end of the modules. Expect to spend 1-2 hours on this portion of the pre-assignment depending on your experience with library research skills.

## Pre-Assignment Grading Rubric

### Student Engagement Quiz (1 point total)

Why did you apply to this introduction to research program? **0.5 points**

List two skills you hope to gain from this course. **0.5 points**

*Part Ia: Find and identify 3 faculty members/researchers who have research programs that you find interesting. Summarize their research in the worksheet provided below (1 point total).*

Researcher 1 (e.g., Faculty member):

URL 1: **0.25 points for listing all three researchers and URLs**

Research Summary 1 (1-2 sentences): **0.75 points for describing all three research summaries**

*Part Ib: Choose one of the three faculty members' research programs you identified in Part I that you would like to learn more about. Devise a question related to his or her research. Write a 500 word essay about the topic of your question. (5 points total).*

Question- **1 point**

Content- **3 points, minus 1 point if it does not meet word count**

Two sources- **1 point (not grading on quality of sources just if they have them), minus ½ point for each source that is not included**

*Part II: Draft a personal resume and professional email to a professor you would like to do research with. Bring a hard-copy to the Summer Research Academy for review. (1 point total)*

**0.5 point for resume**

**0.5 point for email**

*Part III: Discuss the merits of an undergraduate proposal. (5 points total)*

1. Describe how the project will contribute to the field. **0.5 points**

2. How will the author's evidence or data be obtained, analyzed? **0.5 points**

3. Is research design/method sound, are there issues in design, could it be improved? **0.5 points**

4. Understanding in field? Has author cited other research (methods, lit review)? **0.5 points**

5. Are there any confusing parts in proposal? **0.5 points**

6. **Preliminary score** (circle/bold one):

7. **Overall score** (circle one): **0.5 points for all scores**

8. **Decision regarding funding** (circle one):

9. Did your score change after meeting with your group? **0.5 points**

10. Aspects not thought of before discussing with group? Did group disagree about any particular aspect of the proposal? **1 point**

11. Why should or shouldn't this proposal be funded? **0.5 points**

*Part IV: Become familiarized with research strategies and take a 10 question quiz on this material. (5 points total)*

## **Post-Assignment**

### **Post-Assignment - Part I**

*Information Fluency, 4 modules at 2 points each*

**Overview:** These online modules will help you gather and evaluate creditable information in order to write a strong literature review in Part II. They should be completed PRIOR to starting your literature review and are due before your literature review.

- You will be evaluated through an online quiz at the end of each module. You will have two attempts at each quiz, but only the last score will be used so read the material thoroughly as you go through the module. The modules are:
  1. Recognizing a Research Study
  2. Avoiding Plagiarism APA
  3. Conducting a Literature Review
  4. Moving into Discipline Specific Research

### **Part II**

*Literature Review, 10 points*

Typed, double spaced, 12 point font

#### **Point Distribution**

<i>Title/Topic</i>	<i>Content</i>	<i>Citations</i>	<i>Elevator Talk</i>
0.5 point	7 points	1.5 points	1 point

#### **Literature Review Details**

Determine an area of research you are interested in that is related to research currently occurring at \_\_\_\_\_ in your discipline (or a closely related field of study). Create a summary and synthesis (re-organization of that information) of previous research on that topic for a general audience. For the Literature Review, the following aspects should be included:

- List faculty member who inspired topic
- Clear and specific title
- Citations (in-text citations and separate reference list in APA format)
  - a. **At least 4 sources are required;** at least 3 should from primary literature
  - b. In-text/parenthetical citations should match the reference list
  - c. Do not include direct quotes.
- Word count
  - a. Document must be **500-700** words (not including reference list)
- You will also need to create an “elevator talk” at beginning of literature review

- a. Create a concise **30-60** word description about your literature review topic should be able to be understood in the time it would take to ride up an elevator. The goal is to communicate research ideas to a general audience.

## **Submitting the Assignment**

Turnitin.com will be used for this assignment. **A final submission above a 20% similarity index will be given an automatic 0 on the assignment and further action may be taken through the Office of Student Conduct.** Turnitin may recognize bibliographic material in the originality report. If this happens, the instructor will override this and will not count this towards the similarity index.

## **Part III**

### *Developing a Portfolio, 5 points*

Typed, 12 point font. Submit 2 documents, one of your resume and another including your interest summary and timeline.

#### **A) Updated Resume (1 point)**

Use the feedback given by your peer mentor to update your resume as if you were to use it for obtaining an undergraduate research position. This will be graded for formatting, consistency and content.

#### **B) Undergraduate Research Objective Statement (2 points)**

Write a summary describing what you hope to gain and accomplish from engaging in undergraduate research. You should include why you want to engage in undergraduate research, what you hope to gain from undergraduate research, and how undergraduate research will help you meet your future goals (e.g. career, graduate school, professional school). This statement should be limited to be 175-250 words.

#### **C) Undergraduate Research Timeline (2 points)**

Create a timeline for your undergraduate research endeavors. This plan should cover the remainder of your undergraduate career, but be no more than one page. The timeline should include when you plan to contact possible faculty mentors, which programs you are considering applying to and when (i.e., RAMP, SURF), and any other information that may be related to your research endeavors (e.g., graduate school applications, GRE).

## Post-Assignment Grading Rubric

### Part I- Information Fluency (2 possible points for each module= 8 points total)

### Part II- Literature Review (10 points total, REDUCE POINTS AS NEEDED)

2. Appropriate title, topic, and lists faculty that inspired topic- **0.5 points**
3. Content (**7 points**)
  - Introduction
    - i. Establishes a clear topic **1 point**
    - ii. Explains why the topic is important **1 point**
  - Body
    - i. Uses in-text citations of sources **0.5 points**
    - ii. Discusses each source in own words **1.5 points (subtract points if has quotes)**
    - iii. Logical format to discussion with strong transitions between ideas **1 point**
  - Conclusion
    - i. Only includes conclusions that are justified by the literature **1 point**
    - ii. Suggests potential future work or considerations **1 point**
4. Citations (**1.5 points**)
  - Has a citation section with at least 4 citations (3 primary) **0.5 points**
  - Use of credible sources (i.e. Wikipedia vs. peer reviewed journal) **0.5 points**
  - Correct and consistent format for citations **0.5 points**
5. Elevator Talk (**1 point**)
  - Appropriate length **0.5 point**
  - Content **0.5 point**

### Part III- Portfolio (5 points total)

1. Updated Resume- **1 point if incorporates feedback given**
2. Objective Statement about what you hope to gain from undergraduate research- following components must be included:
  - why you want to engage in undergraduate research **0.5 points**
  - what you hope to gain from undergraduate research **0.5 points**
  - how undergraduate research will help you meet your future goals (e.g. career, graduate school, professional school) **0.5 points**
  - Statement is between 175-250 words **0.5 points**
3. Undergraduate research endeavor timeline- following components must be included:
  - When you plan to contact possible faculty mentors **0.5 points**
  - Which programs (RAMP, SURF) considering applying to and when **0.5 points**
  - Any other information that may be related to your research endeavors (e.g., graduate school applications, GRE) **0.5 points**
  - This plan should cover the remainder of your undergraduate career, but be no more than one page **0.5 points**

## **Mini Workshops: Summer Research Academy 2017**

June 17, 12:50-2:50 (4 sessions: 25 minutes each)

All sessions hold 9 students, breakout rooms hold 14

Pegasus Ballroom, Student Union

### **NATIONAL AND INTERNATIONAL FELLOWSHIPS**

Learn more about national and international scholarship and fellowship opportunities to fund your education at both the undergraduate and graduate levels and how to prepare for these awards now. This includes: Fulbright, Goldwater, Truman, and Boren.

Facilitator: Morgan Bauer (Office of Prestigious Awards, Burnett Honors College)

### **ACADEMIC ADVANCEMENT PROGRAMS: EXPLORING THE RESEARCH AND MENTORING PROGRAM (RAMP) AND MCNAIR SCHOLARS PROGRAMS**

This session will provide you with an overview of the program and the application process.

Facilitators: Natalia Toro (AAP, Undergraduate Studies) and Heidi Waite (Peer Mentor)

### **SUMMER OFF-CAMPUS EXPERIENCES**

*Target Student: those who will still be undergraduates in Summer 2018, especially STEM majors*

Explore the possibility of doing research around the country and world during the summer.

Facilitator: Dr. Kimberly Schneider (Undergraduate Research) and Rebecca McLean

### **CAREER PLANNING FOR AFTER GRADUATE SCHOOL: ACADEMIA, INDUSTRY, ETC**

Find out how research skills gained through graduate education make new career opportunities possible.

Facilitator: Dr. Stephen Kuebler (Associate Professor, Chemistry and Optics, College of Sciences)

### **NAVIGATING SOCIAL SCIENCE RESEARCH**

This sessions will review how to ask good questions, working with human subjects, and preparing for graduate education.

Facilitator: Dr. Jana Jasinski (Associate Dean, College of Sciences; Professor, Sociology)

### **PUBLISHING YOUR RESEARCH**

Learn the basic protocols of and procedures for publishing your scholarship in a referred journal.

Facilitator: Xian Nguyen (UCF Undergraduate Research Journal)

### **RESEARCH AS PREPARATION FOR PROFESSIONAL SCHOOL**

*Target Student: those who are interested in law school, medical school, or another health-related field*

Discover how research can enhance your preparation for post-baccalaureate study in the legal and health professions.

Facilitators: Chauntrice Riley-Stanford (Pre- Health and Pre-Law Advising) and Jeanine Garcia (Undergraduate Research)

### **TIPS ON APPLYING TO GRADUATE SCHOOL**

*Target Student: those interested in pursuing Masters degrees or PhDs*

Learn about the application process, including important deadlines, materials necessary for the application, what to look for in a graduate school, and a general ‘to do’ list regarding the process.

Facilitator: George Fulginiti (College of Graduate Studies)

### **WRITING A THESIS– STUDENT PERSPECTIVE**

Learn the basics on how to plan and prepare to write an Honors in the Major thesis.

Facilitators: Devin Burnell, Aaron Santomauro (Peer Mentors)

### ONCE I FIND A MENTOR, WHAT IS THE NEXT STEP? CONFERENCES, SHOWCASES, GRANTS, ETC

Learn about the programs that can help expand your resume after you get involved in a research experience.

Facilitator: Dr. Kevin Jardaneh (Undergraduate Research)

### EMAIL AND RESUME CRITIQUE

Get additional help on your academic resume or initial email to a potential faculty mentor. Please bring a draft of your resume or email to a potential faculty mentor; it may be used as a conversation starter regarding best practices.

Facilitator: Emi Gonzalez-Luna (Undergraduate Research)

### TIME MANAGEMENT FOR UNDERGRADUATE RESEARCHERS

Come learn about strategies and resources to help you manage your time and priorities in your research endeavors and classes. Bring your class schedule so we can start to personalize your plan.

Facilitator: Colleen Smith (Undergraduate Research) and Taylor Goss (Peer Mentor)

### COMMUNITY-BASED RESEARCH

Learn more about Community-Based Research; what is it, what it looks like in your field of study, and about how to get involved in this type of research here at UCF.

Facilitators: Aubrey Kuperman (Undergraduate Research)

### PROGRAM FOR UNDERGRADUATE RESEARCH EXPERIENCE (PURE)

*Target Student: Biomedical Sciences Majors only*

Learn more about the Program for Undergraduate Research Experience, how to apply and get more involved in directed independent research.

Facilitator: Zarina Balde (Peer Mentor)

### SOCIAL MEDIA IN ACADEMIA: TRANSITION TO THE DIGITAL AGE

Interested in using social media and other technologies to enhance your research and help you reach new audiences? Come explore how to use Twitter, Facebook, blogs, and Scratch (a coding platform) to expand your undergraduate research and network with others in your discipline.

Facilitator: Samuel Ortiz (Peer Mentor)

### LETTERS OF RECOMMENDATION: THE BASICS

Letters of recommendation are a requirement for graduate school and professional schools, scholarships, internships, and the job search. Learn more about when and how to ask for letters of recommendation.

Facilitator: Kathryn Thompson (Academic Advancement Programs)

### RESEARCH OUTSIDE OF YOUR MAJOR FOR PRE-HEALTH STUDENTS

*Target: Biomedical and Health Sciences students*

Things do not always go according to plan when it comes to research. Learn more about how persist in your search for a position, including how to find research opportunities outside of your major.

Facilitator: Amber Goerner (Peer Mentor)

## Other Mini-workshop Topic Suggestions:

- Patents
- Senior Design
- Study Abroad
- Lab Notebooks
- Student Perspectives
- Getting Involved on Campus
- “Surviving your city” (things/places to see)
- Pre-health Requirements (medical, nursing, vet, etc.)
- Leaning on Your Previous Community College

## **Student Assignment: Reflection of Mini-Workshops**

### **Purpose:**

The purpose of this assignment is to provide the SRA participants the opportunity to prepare themselves in the areas they feel will be most vital to them during their pursuit of research. In addition, SRA Scholars will obtain information that will help them become prepared for the experiences they will have during their academic careers in research. This assignment will also encourage students to consider how they can include or implement the information provided through the workshops into their own research or academic pursuits.

### **Objectives:**

The main objective of this assignment is to better acquaint SRA Scholars with areas that can influence their preparation for research or graduate school. To achieve this objective, the Scholars must write down a total of **2** things they learned from each mini-workshop they attended. Of these six things, the SRA participants must explain how they would include at least 2 of the strategies or information learned into their own academic careers. Finally, the Participants will also provide feedback regarding their experiences with the mini-workshops.

### **AMMEND: Consider including assignment and collection date**

### **Summary to Scholars:**

- Write down a total of two things you learned from each of the mini-workshops you attended.
- Explain how you will include at least 2 of the 6 things you’ve learned into your future pursuits in research or academics.
- Finally, provide feedback regarding your experience with the mini-workshops.



## **VII. Assessment and Lessons Learned**

**Description:** This section will provide various tools for assessing an undergraduate research course as well as data from prior assessments.

- I. Pre and posttest: 50 multiple choice question test to document gains in student knowledge.
- II. Focus groups feedback: focus group conducted by an external assessment team to determine the alignment of student experience with instructor vision by asking interactive questions to student participants.
- III. Follow-up surveys: given 1 and 2 years after course completion to determine student pursuit of research experiences.

## **Student Assignment: Pre and Post-test**

1. Currently, a patent is issued for a duration of:

- (a) 10 years
- (b) 15 years
- (c) 20 years**
- (d) 17 years

2. The clock on a patent starts:

- (a) when issued
- (b) when filed**
- (c) when the invention is recorded in a lab notebook
- (d) when examined

3. When a patent protecting an invention expires:

- (a) the inventor can apply for a new patent to protect the invention
- (b) the inventor can file a patent extension
- (c) the invention enters the public domain**
- (d) the inventor can copyright the invention

4. Registering a copyright yields what advantage?

- (a) the ability to publish your creative work
- (b) the ability to sue for infringement**
- (c) nothing, other than a plaque you can hang on a wall
- (d) copyright protection, a copyright must be registered to be valid

5. An invention can be published without fear of losing rights to the invention when:

- (a) the invention is recorded in a lab notebook
- (b) a patent is issued
- (c) a patent application is filed or a provisional patent is issued**

6. A faculty member requests you find primary information on recent findings regarding infectious diseases. The resource you would use first to find this information would be:

- (a) Wikipedia
- (b) Google
- (c) CNN
- (d) Web of Science**

7. All papers have a citation count. What is a citation count of a particular paper?

- (a) The count of paragraphs containing citations
- (b) The number of references cited in the paper
- (c) The number of times the paper is referenced by other papers**
- (d) The number of authors and co-authors

8. In general, how far back should you go in referencing literature?

- (a) 10 years
- (b) as far back as electronic copies of the sources are available
- (c) 50 years
- (d) there is no limit on the age of an information source**

9. Consider the following list of information sources:

- [1] Marksman, P. (2010). Environmental Conditions Encyclopedia. Chicago, IL: Dutch Publishing.
- [2] Jeggert, K. (2007). KAKETF: The next generation of type three robot programming. Robotics and Electronics, 3, 16-29.
- [3] Turner, A (1999, August 22). Where have all the birds gone in the Florida Everglades? The New York Times, p 11.
- [4] Brandon, E., Jensen, T., and Sevinc, A. (1988). Growth rates of malaria (*Plasmodium falciparum*) colonies in several protein cultures. Cellular and Molecular, 7, 100-110.
- [5] Hanker, B (2003, December 22). Engineering the highways of tomorrow. Newsweek, 120, 12-16.

Which of the above are secondary sources?

- (a) sources [1], [3], and [5]**
- (b) sources [1], [2], and [4]
- (c) sources [2], [3], and [4]
- (d) sources [3], [4], and [5]

10. In general, which of the following lists publications from least to most peer review.

- (a) technical report, conference article, blog entry, trade article
- (b) blog entry, technical report, conference article, book chapter
- (c) conference article, book chapter, technical report, blog entry
- (d) blog entry, technical report, magazine article, journal article**

11. What is the minimum amount of preparation you should do before you talk to a professor about performing research?

- (a) **read the professor's paper that most closely coincides with your research interests**
- (b) connect with the professor on social media to discuss opportunities
- (c) none (face-to-face dialog is the best way to explore research interests)
- (d) read all the professor's papers so you can be ready for all questions

12. Generally, how do you initiate a request for a research position with a professor?

- (a) drop in when you see the professor is free for a meeting
- (b) request a connection with the professor on social media
- (c) **email or phone, asking for a time when the professor is free for a meeting**
- (d) invite the professor for lunch

13. What should you not bring to your first meeting to request a position?

- (a) your transcripts
- (b) **a cell phone with the ringer on**
- (c) your course schedule
- (d) a copy of the professor's paper that most interests you

14. In a formal letter of introduction, what salutation should you use for a faculty member named Jane Doe?

- (a) "Ms. Doe,"
- (b) "Dear Jane,"
- (c) **"Dear Doctor Doe," or Dear Professor Doe,"**
- (d) no salutation is necessary

15. Which of the following is a good approach to writing a letter of introduction?

- (a) spend time up-front to write a good generic letter that can be sent to any faculty member in the department
- (b) **prepare a short summary of your skills/interests that align with the professor's interest**
- (c) include a paragraph outlining your salary and time expectations
- (d) write at least a page describing your career interests that highlights your passion for research

16. Which of the following sections is most closely associated with a literature review?

- (a) **Background**
- (b) Conclusions
- (c) Introduction
- (d) Experimental Results

17. An initial section of an academic paper that contains a synopsis of the entire paper is the:

- (a) **Abstract**
- (b) Summary
- (c) Review
- (d) Overview

18. If one wishes to show the proportion of freshmen, sophomores, juniors, and seniors making up a major, the best graphic to use would be:

- (a) an infographic
- (b) **a pie chart**
- (c) a bar chart
- (d) an x-y plot

19. T or F: One does not need permission to use an image from a textbook in a journal or conference article.

20. T or F: One does not need permission to use small amounts of text verbatim from another source in a journal or conference article, as long the text is cited and set off from the main text as a quotation.

21. Which of the following does not describe a post-doc:

- (a) working at a university with no teaching responsibilities
- (b) **in a doctoral program having already obtained a master's degree**
- (c) has a PhD
- (d) performs research for a limited duration (typically for one or two years)

22. Most research in the United States is performed at:

- (a) National Labs
- (b) The Armed Services Research Labs
- (c) **Universities**
- (d) Industry sponsored labs and consortiums

23. NSF is an acronym for:

- (a) Needs-based Scholarships and Fellowships
- (b) the Network for Scholary Funding
- (c) the National Scientist Federation
- (d) **the National Science Foundation**

24. Typically, the minimum degree needed to apply for and be awarded NSF research funding is:

- (a) Master of Science
- (b) Doctor of Philosophy**
- (c) Bachelor of Arts
- (d) Bachelor of Science

25. What is an Assistant Professor, typically?

- (a) an assistant to a Full Professor
- (b) an departmental assistant who manages all the graduate students
- (c) someone in industry who teaches specialized topics in the department
- (d) a professor in a probationary period (pre-tenure)**

26. Before testing a hypothesis, you should first:

- (a) perform a literature review of the subject**
- (b) write a paper for possible publication
- (c) patent your idea
- (d) design a series of experiments

27. T or F: The following ‘hypothesis’ is falsifiable: Dinosaurs and humans did not co-exist.

28. The main goal of experimentation in the scientific method is:

- (a) to show a hypothesis is incorrect**
- (b) to prove a hypothesis is correct
- (c) to explain a hypothesis
- (d) to determine a correct hypothesis

29. In the scientific method, the difference between a hypothesis and a theory is:

- (a) a hypothesis is a theory that needs to be tested
- (b) a theory is a hypothesis that is generally accepted to be true by the scientific community**
- (c) there is no difference; they mean the same thing
- (d) a theory is a collection of proven hypotheses

30. Which one of the following is not a rule for proper experimentation within the scientific method?

- (a) record errors
- (b) use a control
- (c) record the data
- (d) draw conclusions as early as possible**

31. T or F: An entry in a lab notebook must be witnessed on the day of entry.

32. The correct procedure for removing information from a lab notebook is:

- (a) removing the page, noting the page removal in the notebook
- (b) redacting the information, making it illegible, but noting the reason for the redaction
- (c) drawing a single line through the information, so that it remains legible**
- (d) you cannot remove information from a lab notebook

33. If you are running an experiment, you generally should not record:

- (a) a list of team members
- (b) experimental parameters
- (c) start time
- (d) the source of funding for the experiment**

34. You are running an experiment and realize during the experiment that the sample temperature was 50 degrees too high. What is the worst thing you could do?

- (a) stop the experiment without recording the attempt
- (b) stop the experiment and record the attempt without further explanation
- (c) stop the experiment and record that the temperature was set too high
- (d) finish the experiment, but do not record the incorrect temperature**

35. The proper laboratory notebook is:

- (a) spiral bound
- (b) an electronic log
- (c) permanently bound**
- (d) a tablet of engineering paper

36. T or F: Generally speaking, bulleted lists are appropriate for presentations.

37. A good rule of thumb for a presentation is:

- (a) three slides per concept
- (b) two minutes of questions for every minute of presentation
- (c) one slide per minute of talk time**
- (d) no more than four paragraphs of text per slide

38. Which of the following should be avoided during presentations?

- (a) informative graphs and tables
- (b) tables of raw data**
- (c) bulleted lists
- (d) legible font size

39. Which of the following should be avoided during presentations?

- (a) reading the text of your more complicated slides**
- (b) showing enthusiasm about the work being presented
- (c) using technical language
- (d) dressing professionally

40. Your talk has been allotted 20 minutes of time, total. Which of the following allocations of time will most likely be optimal?

- (a) 10 minute intro, 5 minutes methods and results, 5 minutes questions
- (b) 5 minute intro, 5 minutes methods and results, 10 minutes questions
- (c) 10 minute intro, 5 minutes methods, 5 minutes results
- (d) 5 minute intro, 5 minutes methods, 5 minutes results, 5 minutes questions**

41. What are morals?

- (a) societal expectations of how one behaves properly with respect to others
- (b) standards of behavior within your research group
- (c) personal beliefs of what is right and wrong**

42. What are ethics?

- (a) societal expectations of how one behaves properly with respect to others**
- (b) standards of behavior within your research group
- (c) personal beliefs of what is right and wrong

43. Who is least deserving of being included as an author on a scientific journal article?

- (a) a faculty member who provided grammatical editing of the paper**
- (b) the graduate student who provided input on the experimental procedures
- (c) the undergraduate student who ran the experiments and recorded the data
- (d) the faculty member who secured the funding for the experiments

44. Which of the following research studies would not require IRB approval?

- (a) collecting opinions about student learning
- (b) determining the efficacy of a new counseling method for combating child obesity
- (c) development of a high power laser**
- (d) measuring the incarceration rates of teen-agers for drug use

45. Your data includes an obvious outlying point that you have no documented reason to exclude. However, performing a curve fit on the data yields a curve that does not support your theory. When excluding the point, the resulting curve and theory match well. How should you deal with this situation when writing up your results for publication? You will be showing the data points and the curve on a graph. Choose the best answer.

- (a) delete the point from the data (but note in the discussion that an outlier has been deleted)
- (b) show the point, but do not include it in the curve fit or discussion
- (c) show two curves, one including the point and one not**
- (d) delete the point from the data (since it is an obvious outlier)

46. The traditional order of sections in a resume are:

- (a) contact information; goal statement; education; employment; skills;**
- (b) contact information; education; employment; goal statement; skills;
- (c) contact information; goal statement; employment; skills; hobbies;
- (d) goal statement; education; employment; skills; contact information

47. Which is not a good general rule for resumes:

- (a) incorporate as much information as possible concerning education and employment**
- (b) one or two pages, at most, in length
- (c) use bulleted lists
- (d) include your phone number and email

48. In asking for a letter of recommendation, what should you not give the faculty member?

- (a) a self-addressed stamped envelope (if a physical letter is required)
- (b) the deadline for the letter
- (c) a resume
- (d) two days notice**

49. If you were to advise someone to drop one of the following experiences from his or her resume, which would it be:

- (a) tuba player in the high school marching band
- (b) homecoming king or queen**
- (c) participant in a study abroad program
- (d) student club officer

50. T or F: You should list the degree you are currently pursuing and your expected graduation date in the education section of your resume.

## **EURO-Boot Camp UCF Focus Group Guide**

### **Introduction**

Hello, my name is (NAME) and I am the (TITLE) of (OFFICE). I want to first thank each of you for joining me this morning/afternoon. Today, I would like to see the

**Introduction to Research** I through your eyes – what is going well for you, what activities inside and outside the classroom you participate in and what you are getting out of your experience. We asked you to join this discussion to get a better understanding of how students are experiencing this course so we can make it better.

It is important that I hear from each of you. There are times that you may find that your experiences are similar to other students in the group. But you may also find that your experiences or opinions are different. It is important to get everyone's perspective, so please don't hesitate to share your opinions, even if they are different from someone else's.

My colleague, (NAME), is here to take notes, because it is difficult for me to follow the discussion and take good notes. We will be using first names only during the focus groups and names are never written into any summaries or quotes; everything that you say today will be held in strict confidence. You will never be identified in any summary or written document. If you would like, we can provide you with a copy of the summary.

Does anyone have any questions?

### **Ice Breaker**

Let's begin by going around the table and getting to know each other a little better. Please give your first name, college and major and year in college (**RECORD IN NOTES ALONG WITH GENDER BY OBSERVATION. NOTE - EXPECT ENTERING TRANSFER STUDENTS AND RISING FTIC SOPHMORES and JUNIORS AND ALL MAJORS**)

### **Discussion Questions**

#### **Learning In-Class**

**Q1.** How did you find out about the UCF- Summer Research Academy?

**Q2.** What were your reasons for taking the class?

**Q3.** Tell me about your classroom learning this semester? What was your experience like in class?

**Probe:** Tell me about your experience with activities in class. (What has been valuable to you?)

**PROBE: WRITING LITERATURE REVIEW EXPERIENCE AND RESEARCH OPPORTUNITES, IF NEEDED, TO COMPARE TO OTHER MODALITIES.**

*(Topics – What is science and academic research, RESEARCH OPPORTUNITIES, HOW TO FIND A MENTOR& CREATE AN ACADEMIC RESUME, WORKING WITH FACULTY AND LAB ETIQUETTE, LIBRARY TOUR/SKILLS, READING A JOURNAL ARTICLE, RESEARCH, ETHICS, TECHNICAL WRITING SKILLS, COMMUNICATION OF SCIENCE RESEARCH, GRADUATE EDUCATION, RESEARCH CAREER OPTIONS)*

*(Assignments – EMAIL AND RESUME, PROFILE FACULTY, LIBRARY Modules and SCAVENGER HUNT, SIX DEGREES OF SEPERATION, LIBRARY MODULES, JOURNAL, ETHICS*

*WORKSHEET, Research Presentation Reviews, Data Collection and Poster-Group Project WRITE AN ABSTRACT, WRITE LITERATURE REVIEW.)*

**Q4.** How has this class affected your understanding of science and undergraduate research?

**Q5.** What would you change about this course?

**Q6.** Is there anything you expected to learn that was not covered?

**Q7.** Describe your experience with the faculty member teaching this class.

**Q8.** Describe your experience with your peer mentor.

**Q9.** What affect did this class have on your interest in and commitment to your major?

**Q10.** Did you get involved in undergraduate research with a lab or faculty member this semester?

#### **GET SHOW OF HANDS –IF A THIRD PROBE**

#### **Learning and Engagement Outside of Class**

**Q11.** Tell me about forming friendships with other students in this class.

**Probe:** How did taking this class together influence your relationships?

NOTE: LISTEN FOR SENSE OF COMMUNITY

### **Plans for Fall and spring semester**

**Q12.** What are your plans for fall and spring semester? Will you participate in undergraduate research?

**Probe:** Have you found an undergraduate research mentor?

**Probe:** Are you going to look for an undergraduate research mentor to work with, if you haven't found one already?

**Probe:** How would you describe your level of preparation and feelings of comfort moving into this research experience?

**Q13.** In what ways did the course help you figure out how to find a mentor to participate in undergraduate research?

**Probe:** If you did not take this course, how easy or difficult would it have been to go about finding an undergraduate research mentor?

### **Overall Experience**

**Q14.** What aspect of your class experience did you like the most?

**Q15.** What did you like the least?

**Q16.** Is there anything else you would like to add that we may not have talked about?

## Focus Group Feedback

<b>Mode</b>	<b>Strengths</b>	<b>Suggested Improvements</b>
All	- Overall students described extremely high levels of satisfaction with their learning experiences	NA
SLS	- Students detailed that the course “expanded the whole research process,” “broadened their skills,” and gave them the opportunity to do “the act of doing research.” All agreed that the assignments were engaging and comprehensive. (UCF) - All agreed that the assignments helped them learn more about research. (WSU)	- Students asked that the class presenters post or e-mail their PowerPoint presentations. They also suggested virtual lab tours. (UCF) - Some students were surprised about the amount of work for a one-credit class. Others commented that attending research seminars conflicted with their schedule. (WSU)
FLBC	- All agreed that the assignments helped them learn more about research and gain confidence engaging in undergraduate research. (UCF) - Content reported as most valuable included resume writing, speakers, writing an abstract and the general structure of the class—“present, observe, manage, record and work in groups.” (WSU) - Content reported as most valuable included resumes, career center feedback, mock interviews, literature review, approaching a faculty member, abstract writing, posters, group work, and lab tours. (UA)	- Students learned library content in prior courses. Students asked for speakers from their disciplines. Students thought it was important to reflect the actual schedule during registration. (UCF) - Some students expressed frustration about using the library to find and reference articles. Students asked for lab tours and suggested groups could be split based on their disciplines. (WSU) - Students wanted to learn more about how writing the literature review fits into the research process. Students also expressed a preference for choosing the research lab to visit. (UA)
PMSC	- Content reported as most valuable included lab tours, workshops, resumes, learning about other disciplines and etiquette, guest speakers, and group work. (UCF) - Content reported as most valuable included resumes, e-mails, lab tours, meeting professors, and library activities—physical library and using online databases. (WSU) - Content reported as most valuable included resumes, speakers, research initiatives, mock interview, designing experiment and poster, and lab tours. (UA)	- Students observed that lab tours were less valuable when the lab had not structured the visit. They asked for additional activities related to graduate school. (UCF) - Students asked for lab tours geared toward their major. Some preferred a 4–5 day course. Students also asked for additional feedback on resumes. (WSU) - “The amount of time allotted for each exercise was excessive.” Students wanted more time to conceptualize the experiment. They also asked for class time to start the literature review and receive feedback on a draft. (UA)

*Note:* From Lancey (2012–2014). FLBC = faculty-led boot camp; PMSC = peer-mentor short course; SLS = semester-long seminar. UCF = University of Central Florida, WSU = Washington State University, UA = University of Alabama.

## **Student Assignment: Post-course Survey**

- 54.8% of the students were involved in undergraduate research 1 year later;
- 57% of the students involved in research had secured paid research positions;
- 35.1% of the students not involved in research, one year later, report they realized that (a) they were not interested in research, or (b) they had insufficient time for research;
- 76.5% of the students were involved in undergraduate research 2 years later;
- 80% of the students involved in research, including both 1 year and 2 years later, reported that the course prepared them for involvement in research; and
- 74% of the students involved in research reported that the course made them a better candidate for research

*Note: data taken from 2013-2014 survey of course graduates (Jump Starting Research: Preresearch STEM Programs)*

Q1: What university do/did you attend?

- University of Alabama
- University of Central Florida
- Washington State University

Q2: What year did you participate in an Introduction to Research course/event?

- 2011
- 2012
- 2013
- 2014
- 2015
- I did not participate
- I do not recall

Q3: How long was your Introduction to Research course/event?

- 3 days
- 1 week
- full semester
- academic year

Q4: Have you graduated from your university?

- Yes, I graduated
- No, I am still a student
- No, I transferred to another college/university
- No, I am not enrolled at any college/university

Q5: What is your major?

Q6: In what discipline area is your major?

- Arts and Humanities
- Business
- Computer Science
- Education
- Engineering
- Life Sciences
- Mathematics
- Physical Sciences (Chemistry, Physics)
- Social Sciences
- Other, please specify:

Q7: After graduation, what are your future plans, or if you graduated, what is your current professional pursuit?

- Attend graduate school in my major or a related field
- Attend graduate school in a field unrelated to my major
- Pursue an advanced degree in a different area (e.g., medical school, law school, physical therapy)
- Work in a field related to my major
- Work in a field NOT related to my major
- Don't know
- Other, please specify:

Q8: As you reflect on your experience with the Introduction to Research course/event, are there ways it could have better prepared you for undergraduate research?

Q9: As you reflect on your experience with Introduction to Research course/event, what skills and content was most beneficial?

Q10: As you reflect on your experience with Introduction to Research course/event, what skills and content was least beneficial?

Q11: After participating in the Introduction to Research course/event, how many semesters have you spent participating in Undergraduate Research with a faculty mentor?

- 0
- 1
- 2
- 3
- 4 or more

Q12: Which programs have you participated in as a researcher? (CHECK ALL THAT APPLY)

- Honors/Senior Thesis
- Independent Research/Stdy Credit
- Off-Campus Research Experience
- Paid Research Position
- Volunteer Research Position
- Other, please specify:

Q13: How well did the Introduction to Research course/event prepare you to get involved in research?

- A great deal
- A fair amount
- Somewhat
- Not at all

Q14: Did the course/event make you a better candidate for a research position?

- Yes, definitely
- Yes, a little bit
- Maybe
- No

Q15: Do you think you would have gotten involved in research without attending the Introduction to Research course/event?

- Yes
- Maybe
- No

Q16: As a researcher, have you won any awards, traveled to conferences, or participated in other research endeavors? Please explain.

Q17: Please provide information regarding your research faculty mentor(s). The instructor of your Introduction to Research course/event would like to obtain feedback from faculty mentors to improve and expand the program

- Mentor's name:
- Mentor's email address:
- Additional Mentors:

Q18: Have you participated in any internship or co-op opportunities (Please include research and non-research experiences)?

- Yes
- No

Q19: Please share details about this opportunity including, but not limited to, name of position, company, type of position etc.:

Q20: Did the Introduction to Research course/event make you a better candidate for an internship or co-op position?

- Yes, definitely
- Yes, a little bit
- Maybe
- No



## **VIII. Training Student Mentors**

**Description:** Peer mentors are a key component of the undergraduate short course. They remain responsible for the scholars and their assignments throughout the events, and are trained to be approachable and knowledgeable of the material. Selected through an application process, they participate in several training sessions prior to the event, covering topics like best practices, professionalism, and how to facilitate discussions. They are given a manual including guidelines and activities to conduct throughout the various workshops with the scholars.

- I. Peer Mentor Training Schedule
- II. Interactive Techniques and Best Practices
- III. How to Get Started with Ice Breakers
- IV. Peer Mentor Training Samples
- V. Mentor Training Ethics Cheat Sheet

## **Summer Research Academy Mentor Training Schedule**

### **Orientation:**

- Introductions - 20 minutes
- Overview of schedule– 20 minutes
- Train the Trainer – 10 minutes
- Logistics (e.g., payroll, shirts, photos) (Aubrey) – 15 mins
- Homework assignments review – 20 minutes
  - *Homework*: email mini-bio to OUR; email mini-workshop proposals; bring resume for next session; review the following: training materials, interactive techniques, mini-workshops, [www.SRA.ucf.edu/scholars](http://www.SRA.ucf.edu/scholars). read facilitating discussion chapter, complete FERPA training, bring one journal article related to your research for next session

### **Training Session – Morning:**

- Introductions and Icebreaker (Kim) – 30 mins
- Overview of training, responsibilities, and syllabus mini-workshops, site visits, and the academy (Kim)- 45 mins
- Overview of site visits (Kevin) - 20 mins
- Distribution of groups and overview of contacting students (Aubrey)- 30 mins
- Overview of pre-assignment (Kevin)- 15 minutes
- Workshops 1, 2, 3, and 4 (Aubrey) – 90

### **Training Session - Afternoon:**

- Workshop 5, 6, 7 and 8 (Kim)- 75 mins
- Effective Communication (Aubrey)- 45 mins
- Review facilitating discussions (Aubrey)- 15 mins
- Review of student assignments (Kevin)- 30 mins
- *Homework*: Review workshops and assignments, plan ice breakers, send reminder email to participants with a deadline for questions about the pre-assignment; update resume and send to [OUR@ucf.edu](mailto:OUR@ucf.edu) by 8 a.m. on Monday

### **Pre-SRA Team Meeting:**

- Review of academy (Kim)
- Review post-academy assignment (Kevin)
- Updates to schedules (Kevin)
- Distribution and overview of site visit schedules (Kevin and Kim)
- Distribution of accordion binders, assignments, and recording sheet (Aubrey)
- Q & A

- *Homework:* Walk through site visit schedule, find information on faculty you will be visiting, wear T-shirt tomorrow

## Interactive Techniques

Interactive techniques revive students from their passivity of merely listening to a lecture and instead become attentive and engaged—two prerequisites for effective learning. These techniques are often perceived as “fun”, yet they are frequently more effective than lectures at enabling student learning.

1. **Classroom Opinion Polls** – Informal hand-raising suffices to test the waters before a controversial subject.
2. **Everyday Ethical Dilemmas** – Present an abbreviated case study with an ethical dilemma related to the discipline being studied.
3. **Make Them Guess** – Introduce a new subject by asking an intriguing question, something that few will know the answer to (but should interest all of them). Accept blind guessing for a while before giving the answer to build curiosity.
4. **Pass the Chalk** – Provide chalk or a soft toy; whoever has it must answer your next question, and they pass it on to the student of their choice.
5. **One-Minute Papers** – Students write for one minute on a specific question (which might be generalized to “what was the most important thing you learned today”). Best used at the end of the class session.
6. **Muddiest Point** – Like the Minute Paper, but asks for the “most confusing” point instead. Best used at the end of the class session.
7. **One-Sentence Summary** – Summarize the topic into one sentence that incorporates all of who/what/when/where/why/how creatively.
8. **Directed Paraphrasing** – Students asked to paraphrase part of a lesson for a specific audience (and a specific purpose).
9. **Think-Pair-Share** – Students share and compare possible answers to a question with a partner before addressing the larger class.
10. **Pair-Share-Repeat** – After a pair-share experience, ask students to find a new partner and debrief the wisdom of the *old* partnership to this *new* partner.
11. **Wisdom of Another** – After any individual brainstorm or creative activity, partner students up to share their results. Then, call for volunteers of students who found their partner’s work to be interesting or exemplary. Students are sometimes more willing to share in plenary the work of fellow students than their own work.
12. **Forced Debate** – Students debate in pairs, but must defend the opposite side of their personal opinion. Variation: half the class take one position, half the other. They line up and face each other. Each student may only speak once, so that all students on both sides can engage the issue.

*Brainstorming (We use these in forming the definitions of what is research, etc.)*

13. **Brainstorming on the Board** – Students call out concepts and terms related to a topic about to be introduced; the instructor writes them on the board. If possible, group them into categories as you record the responses. Works to gauge pre-existing knowledge and focus attention on the subject.

14. Brainstorming in a Circle – Group students to discuss an issue together, and then spend a few minutes jotting down individual notes. One person starts a brainstorming list and passes it to the student to the right, who then adds to the list and passes it along again.
15. Chalk Talk – Ask students to go to multiple boards around the room to brainstorm answers to a prompt/assignment, but disallow all talking. Can also be done in groups

## **Best Practices for Peer Research Mentors**

- Be professional! Keep in mind that you are grading the students, and if for no other reason, you should keep correspondence and interactions with your students professional.
- Be accessible! Don't be too formal, especially in person. Present yourself as welcoming and friendly. You want your students to feel comfortable asking you questions or expressing concerns.
- Be confident! Remember that your mentees are there to learn from you, so don't be afraid to share your stories and insights and to encourage comments and questions.
- Save all emails from students; it is recommended that you create a folder in your inbox so that you can quickly access archived emails from students if they have an issue or dispute or would like clarification about something.
- Make an “everything” schedule before the academy that includes notes, assignments, and icebreakers you've chosen.
- Learn their names quickly. One trick is to study their names before you meet them. Then it's just matching the names up to faces instead of learning both!
- If a student asks a question (and they are willing to let you share it), then address the whole group to allow everyone to benefit from the answer. Chances are that several students also had the same question in mind but just didn't ask.
- Some students will be very talkative and some may be very quiet. Create opportunities during discussions and breaks for quieter students to get some talking time.
- At the same time, don't force someone to talk. It could halt the flow of the discussion. Instead try to ask the quiet student(s) questions about themselves during downtime. This can help to open them up and make them feel more comfortable talking.
- Be creative with the short breaks between speakers and activities (when appropriate); it is always useful to have a fun ice breaker or short game in between speakers or on walks between site visits.
- Additionally, sharing your experience during these periods can be very helpful to students as well; they may be able to learn as much from you as they can from the speakers.

- Your fellow peer mentors' contact information is provided. It may come in handy if you have a question and cannot get a hold the coordinators.
- The Coordinators are here to help as well before, during and after the academy.

## **How to Get Started Breakout Session Cheat-Sheet**

Points to mention if they don't come up with it themselves:

- Address as Dr. not Mrs., Mr., or first name
- Introduce yourself with name, major, year, etc.
- Anticipated graduation date
- Relevant coursework completed
- Mention you've gone through SRA
- Show interest in professors research
- Demonstrate that you are familiar with research
- Talk about any research skills
  - Ex: PCR from lab class, etc.

## **Commonly Used Icebreakers**

### Three Questions Game

- Everyone in the group writes down 3 provoking questions they would like to ask others in the group. Not the normal "what's your name" type questions but something like, "Where is the most interesting place you have ever traveled" or "Name a topic you feel absolutely passionate about"
- Give them time to mingle, and to ask three different people in the group one of their three questions.
- Get back together and have each person stand and give their name. As they say their name, ask the group to tell what they know about this person.

### Dream Vacation Game

Ask participants to introduce themselves and describe details of the ideal, perfect dream vacation.

### Famous People/Cities Game

- As each participant arrives, tape a 3 x 5 index card on their back with the name of a famous person or city.
- They must circulate in the group and ask questions that can ONLY be answered with a YES or NO to identify clues that will help them find out the name of the person or city on their index card.
- After an allotted amount of time bring the group back together and have everyone guess who they are.

### Creative Name Tags

Give everyone 15 minutes to make their own name tag-they can list hobbies, draw a picture, give a self-profile, etc.

### Ball Toss Game

Have everyone form a resemblance of a circle. It does not have to be perfect, but they should all be facing in, looking at each other. Ask a question and then toss a nerf ball or bean bag to a person and have them answer it. They then toss the ball to someone else who does the same. Continue the exercise until everyone has caught the ball and answered that question. Then start again with a new question.

### Four Facts Game

Each person writes down four facts about themselves, one of which is a lie. Each person takes turns reading their list aloud and the rest of the team writes down the one they think is the lie. When all are done reading the lists aloud, the first person reads their list again and identifies the lie. The team sees how well they did.

### Name Game

Students form circles in groups of 8-10 and one at a time state their name with an alliterative action: “I’m Jumping James!” Optimally, they should perform the action as well. They proceed around the circle, stating names and performing the actions, adding names one at a time, until the last person in the circle will have to say everyone’s name and perform all the actions.

### Question Game

Ask the students three specific questions about themselves and then have them share their answer with other people two times- taking on the identity of the person they talk to each time. After everyone has switched two times come back together and have one student start by introducing who they are by saying “their” name and the three answers to the questions. Whoever they are introducing should then go and introduce who they are.

## **Mentor Training Version: Finding a Faculty Mentor**

### **Objectives:**

1. Discuss how to contact the faculty and what type of information to include in an email. Consider making a checklist of things that should be included in that email such as the following:

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

d. \_\_\_\_\_

- e. \_\_\_\_\_
2. Focus on the following:
- a. The faculty member’s research area – and how the faculty member became interested in those topics/that research agenda.
  - b. The skills a potential undergraduate researcher (UGR) will need to possess or develop to work with this mentor.
  - c. The roles and responsibilities of a UGR working with this mentor.
  - d. How to approach a potential mentor about one’s own research ideas – and how to determine if the faculty member is interested in working together on that project.
  - e. How to determine if one “clicks” with a potential faculty mentor; how to establish a rapport with a mentor.
3. Emphasize the importance of doing background research about the answers to these questions *prior to* contacting and meeting with potential mentors.
- a. Discuss some strategies and resources for conducting these “background checks.”
4. Facilitate a discussion in which participants identify the main questions to ask a potential mentor and talk about the sorts of discussions they, as undergraduate researchers, will need to have with faculty mentors. Questions include:
- a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_
  - e. \_\_\_\_\_

**Strategies:**

1. Tell the students your own personal experience about how you approached your mentor and got involved in undergraduate research.
2. Print copies of a biography for a faculty member in the department/discipline of your group and go over with the participants how they might approach and speak with that person with the goal of doing undergraduate research.

**Notes:**

## **Mentor Training Version: Research Ethics**

### **Objectives:**

1. Facilitate a discussion about ethical issues using the provided case studies. The case studies are discipline specific but have the following overarching themes:
  - a. An ethical issue specific to your discipline
  - b. Authorship
  - c. The ethics of using and representing data
2. Understand that these issues are present in all disciplines and that they may be handled in different ways (e.g., authorship). Also, note that these problems are not common.
3. Discuss resources available to students with ethical dilemmas.
  - a. Graduate students and post-docs in your research group
  - b. Faculty other than your research advisor
  - c. The university office associated with concerns
4. Have students synthesize these concepts by answering the provided questions.

### **Strategies:**

Your students should feel fairly comfortable voicing their opinions at this point. For this discussion, let the students take the reins while you keep the discussion focused—they should be discussing what *they* think is ethical or immoral. Conversely, if there are standards within your discipline (e.g., for authorship), do share these with your group. But remember, there are no right or wrong answers. The goal is for students to think critically about these issues.

You may wish to have the students discuss how these issues could relate to their own future research project, but you should be sure to stress that these types of situations are not very common. We don't want to scare the students.

### **Ethics Cheat Sheet for Mentors**

\*this is just some basic info in case your mentee's ask you about something- the case studies have questions to go through and they are mostly straight forward and opinions that the mentees can discuss in your groups

### **1964 and 1975 Helsinki Declarations:**

- Any research on a human being must:
- Have informed consent for experiments

- Research must be kept under peer review
- Benefits vs. Risks must be spelled out to and understood by the patient

## **Ethical Principles in Research**

1. Principle of Beneficence:
  - a. The moral obligation to act for the benefit of others, to help others further their important and legitimate interests
  - b. Benefit means: helping, rescuing, relief of pain, removal of cause of illness, mitigation of damage of illness
2. Principle of Non-maleficence
  - a. To do or cause no harm
  - b. Harm means: action that thwart, defeat, set back, the legitimate interests of others in personal integrity, property, privacy, liberty, etc. (sometimes the unintended result of a beneficent action.)

Two Different terms:

- Malevolence: wishing/choosing to cause harm
- Maleficence: Causing harm but not desiring or intending to do so.

Problem of Double Effect:

- Intended effect causes foreseen but unintended effect.
3. Principle of Autonomy
  - a. Autonomy means self-rule that is free from both controlling interference by others and from limitations, such as inadequate understanding, that prevents meaningful choice
  - b. For research- need informed consent
4. Principle of Justice
  - a. The moral virtue of a political society and its institutions
  - b. For research- fairness in all reciprocal relationships, giving full moral standing to all participants, avoiding undue favoritism, exploitation or profit

## **Adhering to Ethical Norms in Research**

- Norms promote the aims of research, such as knowledge, truth, and avoidance of error.
  - For example, prohibitions against fabrication, falsifying, or misrepresenting research data promote the truth and avoid error.
- Ethical norms promote the values that are essential to collaborative work, such as trust, accountability, mutual respect, and fairness.

- For example, many ethical norms in research, such as guidelines for authorship, copyright and patenting policies, data sharing policies, and confidentiality rules in peer review, are designed to protect intellectual property interests while encouraging collaboration. Most researchers want to receive credit for their contributions and do not want to have their ideas stolen or disclosed prematurely.
- Ethical norms help to ensure that researchers can be held accountable to the public
  - For instance, federal policies on research misconduct, conflicts of interest, the human subjects protections, and animal care and use are necessary in order to make sure that researchers who are funded by public money can be held accountable to the public.
- Ethical norms in research also help to build public support of research
  - People are more likely to fund research projects if they can trust the quality and integrity of research.
- Many of the norms of research promote a variety of other important moral and social values
  - Such as social responsibility, human rights, animal welfare, compliance with the law, and health and safety.

**Ethical lapses in research can significantly harm human and animal subjects, students, and the public.**

### **Codes and Policies for Research Ethics**

- Honesty, Objectivity, Integrity, Carefulness, Openness, Confidentiality, Mentoring, Respect for Intellectual Property, Responsible Publication, Non-Discrimination, Respect for colleagues, Social Responsibility, Competence, and Legality
- The primary concern of the investigator should be the safety of the research participant. This is accomplished by carefully considering the risk/benefit ratio, using all available information to make an appropriate assessment and continually monitoring the research as it proceeds.
- The scientific investigator must obtain informed consent from each research participant. This should be obtained in writing (although oral consents are sometimes acceptable) after the participant has had the opportunity to carefully consider the risks and benefits and to ask any pertinent questions. Informed consent should be seen as an ongoing process, not a singular event or a mere formality.
- The investigator must enumerate how privacy and confidentiality concerns will be approached. Researchers must be sensitive to not only how information is protected from unauthorized observation, but also if and how participants are to be notified of any unforeseen findings from the research that they may or may not want to know.
- The investigator must consider how adverse events will be handled; who will provide care for a participant injured in a study and who will pay for that care are important considerations.

- In addition, before enrolling participants in an experimental trial, the investigator should be in a state of "equipoise," that is, if a new intervention is being tested against the currently accepted treatment, the investigator should be genuinely uncertain which approach is superior. In other words, a true null hypothesis should exist at the onset regarding the outcome of the trial.