PLEASE NOTE: To ensure that a series of changes to an existing degree program does not essentially create a new program, the Southern Association for the Accreditation of Colleges and Schools (SACS) requires submission of its Substantive Change Checklist for every program change. Prior to college-level review, you must fill out and submit the SACS Substantive Change Checklist to the Office of Institutional Effectiveness. Contact Institutional Effectiveness (OSPIE@uky.edu) for assistance.

Once approved at the college level, your college will send the proposal to the appropriate Senate academic council (HCCC and/or UC) for review and approval. Once approved at the academic council level, the academic council will send your proposal to the Senate Council office for additional review and then a 10-day posting online, during which senators review on their own and have an option to register an objection if they so desire. If no objection is raised to the Senate Council Office within ten days of the posting the proposal, then the program change is approved. The Senate Council Office will report approvals to the Provost, Registrar and other appropriate entities, including the contact person.

For every proposed change, you MUST also include the existing requirement.

SUMMARY OF CHANGES			
Check all that apply.			
☒ Courses	☐ Program name	☐ Total required credit hours	☒ Student learning outcomes
☐ Criteria for admissions/progression/termination	☐ Certificate assessment	☐ Other	

1. General Information				
1a	Date of contact with Institutional Effectiveness (IE)[1] :	December 4, 2018		
	☒ Appended to the end of this form is a PDF of the reply from Institutional Effectiveness.			
1b	College[2]:	Arts and Sciences	Department[2]:	Biology
1c	CIP code[3]:	26.0101	Today's Date:	December 2, 2018
1d	Current major name: (Biology, Design, etc.)	Biology	*Proposed major name:*	*same*
1e	Current Degree (BA, BFA, etc.):	BS	*Proposed degree:*	same
1f	Will there be any changes regarding a track(s) for the program?		Yes ☒	No ☐
1g	Accrediting agency, if applicable:			
1h	Date of most recent periodic program review for this degree:	2012; one happening currently		
1i	Requested effective date:	☒ Fall semester following approval.	OR	☐ Specific Date[4]: *Fall 2019*

[1] Prior to college-level review, you must fill out and submit the SACS Substantive Change Checklist to the Office of Institutional Effectiveness. You can reach Institutional Effectiveness by phone or email (257-1962 or OSPIE@uky.edu).
[2] It is not possible to change the home academic unit of a degree program via this form. To change the home unit, visit https://www.uky.edu/universitysenate/forms and look for the heading, "Forms Related to Academic Organizational Structure."
[3] The CIP code is provided by Institutional Effectiveness. If a different CIP code is necessary, the program may undergo a review similar to the new program approval process.
[4] No program change(s) will be effective until all approvals are received.

1j	Contact person name:	Jennifer Osterhage	Phone / Email:	257-9322 / jennifer.osterhage@uky.edu

2. Overview of Changes

2a Describe the rationale for the changes, including results from the most recent program review if applicable. (*450 word limit*)

We are seeking to change the way that students fulfill the GCCR. Currently, the oral communication portion of the requirement is fulfilled by BIO 425 (Biology seminar), a required course for our major. We are not changing the way that students fulfill that portion of the requirement. The written communication portion of the requirement is currently fulfilled by two courses: BIO 350 (Animal Physiology) and BIO 430G (Plant Physiology). Students also have the option of taking WRD 204 to fulfill the entire GCCR, but very few of our students utilize this option. We would like to drop BIO 350 and WRD 204 as courses that can fulfill the requirement and instead allow students to fulfill the written requirement by choosing one course out of the list below.

We propose that students can fulfill the written portion of the GCCR requirement through one of the following courses:

1. BIO 398 (Reseach and Writing in Biology): At the October 2018 faculty meeting, we approved a new course that is equivalent to BIO 395 except that it will contain a writing requirement that fulfills the GCCR. The degree audit system cannot distinguish between GCCR and non-GCCR sections of the same course, necessitating the need for a new course. This new course number would also ensure that all students completing independent research would only have to fulfill the GCCR requirement once (the semester they choose to register for BIO 398).
2. BIO 404 (Advanced Genetics)
3. BIO 405 (Human Genetics)
4. BIO 418 (Ecological Genetics)
5. BIO 430G (Plant Physiology)
6. BIO 445 (Biology of Sex)
7. WRD 310 (Writing in the Natural Sciences)
8. WRD 305 (Writing Public Science)

Students would receive upper-level Biology elective credit for completion of WRD 310 OR WRD 305. WRD 305 OR 310 would be added as an acceptable upper-level elective in the General Biology track. Students in any of our seven tracks would be able to take the course since they can choose any course outside of their track from the "General Biology" list to complete their elective requirements.

Students will continue to fulfill the oral communication portion of the requirement through BIO 425.

Note: Because all of these courses will count towards the major, we are NOT adding any additional credit hours to our degree requirements.

Note 2: BIO 425 and BIO 430G have previously been approved to fulfill either the oral or written components of the Biology GCCR. WRD 310 has been approved as a GCCR course for Chemistry and Engineering majors. We are asking now for approval to have this course also count for the Biology GCCR. For courses not yet approved, we have submitted syllabi for evaluation by the GCCR committee. We have also completed the GCCR change form and submitted a new course form for BIO 398 (the only new course being proposed).

Advantages of current proposal:

1. Students tailor their experience to their specific interests/goals.

Biology majors are not a homogeneous population, and the one-size-fits-all approach to the GCCR may not best serve the needs of our diverse student body. With this suite of three options, students will be able to target which GCCR aligns with their professional goals:

- The BIO 398 option: This would be ideal for the majority of our students who are aiming for professional

careers in the life sciences. They would gain experience in primary-literature style scientific writing using their own data/project. This approach also adds a measure of consistency to the grading across BIO 398 sections.
- Upper-level BIO elective option: this option allows students to choose courses based on their interests; most of the courses that include a paper requirement allow students to pick their own topic, which will encourage students to delve deeply into a subject of their choosing.
- WRD 310/305 option: these courses would be ideal for students not planning to enter fields that require primary literature style writing. Instead, the students would gain valuable skills in communicating science to non-experts. In both of these courses, students can tailor their writing assignments to fit their interests.
2. Feedback and evaluation performed by faculty experts
3. Removes burden from BIO 350 faculty and teaching assistants and allows for increased flexibility in the BIO 350 course

Related to this change, we would like to add WRD 305 and WRD 310 to our list of acceptable upper-level electives in the General Biology track. This will allow students to fulfill the GCCR with courses that count towards the major, so that we do not increase the number of credit hours required of our majors.

Because we are expanding the ways in which our GCCR will be fulfilled, we are also requesting to change one of our student learning outcomes. See appended documents for original and updated language.

2b Use the fields below, as applicable, to identify the areas in which changes will be made.

		Current	*Proposed*
i.	Credit Hours of Premajor Courses:	25	*25*
ii.	Credit Hours of Preprofessional Courses:		
iii.	Credit Hours of Major Core Course Requirements	24	*24*
iv.	Minimum Credit Hours of Guided Electives:	32	*32*
v.	Minimum Credit Hours of Free Electives:	6	*6*
vi.	Credit Hours for Track 1 (name):	120	*120*
vii.	Credit Hours for Track 2 (name):		
viii.	Credit Hours for Track 3 (name):		
ix.	Credit Hours for Track 4 (name):		
x.	Credit Hours for Track 5 (name):		
xi.	Credit Hours for Required Minor:		
xii.	Total Credit Hours Required by Level: 100-level:		
	200-level:		
	300-level:		
	400-level:		
	500-level:		
	TOTAL CREDIT HOURS REQUIRED FOR GRADUATION:	120	*120*

xv. If the total hours required for graduation have changed, explain below. (*150 word limit*)

No change

2c Will the requested change(s) result in the use of courses from another educational Yes ☒ No ☐

	unit?		
	If "Yes," describe generally the courses and how they will used.		
	Students can choose to take WRD 305 OR WRD 310 to fulfill the written communication requirement of the GCCR. We anticipate that around ~60 students per year will utilize this option (see full proposal attached). WRD 305 and WRD 310 will also be added to our acceptable upper-level elective list in the General Biology track.		
	If "Yes," two pieces of supporting documentation are required. ☒ Check to confirm that appended to the end of this form is a letter of support from the appropriate chair/director[5] of each unit from which individual courses will be used. ☒ Check to confirm that appended to the end of this form is verification that the chair/director of each affected unit has consent from the faculty members of the unit. This typically takes the form of meeting minutes.		
2d	Will the proposed change(s) affect an associated minor?	Yes ☐	No ☒
	If "Yes," the department must also submit a change form to change the minor.		

3. UK Core Courses

3a	Are there any proposed changes to the UK Core requirements for the program? (If "Yes," indicate and proceed to next question. If "No," indicate and proceed to 4a.)	Yes ☐	No ☒
	If "Yes," note the specific changes in the grid below.		

UK Core Area	Current Course	Current Credits	*Proposed Course*	*Proposed Credits*
I. Intellectual Inquiry				
Arts and Creativity				
Humanities				
Social Sciences				
Natural/Physical/Mathematical				
II. Composition and Communication				
Composition and Communication I	CIS/WRD 110	3	*CIS/WRD 110*	*3*
Composition and Communication II	CIS/WRD 111	3	*CIS/WRD 111*	*3*
III. Quantitative Reasoning				
Quantitative Foundations				
Statistical Inferential Reasoning				
IV. Citizenship (one course in each area)				
Community, Culture & Citizenship in USA				
Global Dynamics				
Total UK Core Hours		____		____

3b	Provide the Bulletin language about UK Core.	

[5] A dean may submit a letter only when there is no educational unit below the college level, i.e. there is no department/school.

4. Graduation Composition and Communication Requirement			
4a	Will the Graduation Composition and Communication requirement be changed? (If "Yes," indicate and proceed to next question. If "No," indicate and proceed to 5a.)	Yes ☒	No ☐
	If "Yes," note the specific changes below, including changes to credit hours. If the course(s) used are from outside the home unit, one piece of supporting documentation is required. ☒ Check to confirm that appended to the end of this form is a letter of support from the other units' chair/director[6] from which individual courses will be used.		

	Current	*Proposed*
i.	☐ Single course in home unit:	☐ *Single course in home unit:*
ii.	☐ Multiple courses in home unit.	☐ *Multiple courses in home unit.*
iii.	☐ Single course outside home unit.	☐ *Single course outside home unit.*
iv.	☐ Multiple courses outside home unit.	☐ *Multiple courses outside home unit.*
v.	☒ Course(s) inside & outside home unit. WRD 204, BIO 425 (oral requirement), BIO 350 (written requirement) and BIO 430G (written requirement)	☒ *Course(s) inside & outside home unit. BIO 425 (oral requirement), BIO 398, BIO 404, BIO 405, BIO 418, BIO 430G, BIO 445, WRD 305 or WRD 310 (written requirement)*

4b	Provide the Bulletin language about GCCR below.
	In order to meet the Graduation Composition and Communication Requirement (GCCR), students must successfully complete BOTH BIO 425 to fulfill the oral communication requirement AND one course from the list below to fulfill the written communication requirement. *In order to receive GCCR credit a student must:* *(a) Earn an average grade of C or better on all GCCR assignments and* *(b) Have completed at least 30 credit hours of college-level coursework prior to registering for the course.*

Oral Communication Requirement	*Credit Hours*
BIO 425 (Biology Seminar- subtitle required)	*1*
Written Communication Requirement	
Choose one course from the following 8 options:	
BIO 398 (Research and Writing in Biology)	*1-3*
BIO 404 (Advanced Genetics)	*3*
BIO 405 (Human Genetics)	*3*
BIO 418 (Ecological Genetics)	*3*
BIO 430G (Plant Physiology)	*4*
BIO 445 (Biology of Sex)	*3*
WRD 305 (Writing Public Science)	*3*
WRD 310 (Writing in the Natural Sciences)	*3*

5. Other Course Changes			
5a	Will the college-level requirements change? (If "Yes," indicate and note the specific changes in the grid below. If "No," indicate and proceed to question 5c.)	Yes ☐	No ☒

Current	*Proposed*
☐ Standard college requirement	☐ *Standard college requirement*

[6] A dean may submit a letter only when there is no educational unit below the college level, i.e. there are no departments/schools.

	☐ Specific course		☐ *Specific course*			
Prefix & Nmbr	Credit Hrs	Title	*Prefix & Nmbr*	*Credit Hrs*	*Title*	*Course Status*[7]
						Select one....
						Select one....
						Select one....

5b	Will the existing language in the Bulletin about college-level requirements change?	Yes ☐	No ☒
	If "Yes," provide the new language below.		

5c	Will the pre-major or pre-professional course requirements change? (If "Yes," indicate and note the specific changes in the grid below. If "No," indicate and proceed to question 5e.)	Yes ☐	No ☒

Current			*Proposed*			
Prefix & Nmbr	Credit Hrs	Title	*Prefix & Nmbr*	*Credit Hrs*	*Title*	*Course Status*[8]
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....

5d	Provide the Bulletin language about pre-major or pre-professional courses below.

5e	Will the major's core course requirements change? (If "Yes," indicate and note the specific changes in the grid below. If "No," indicate and proceed to question 5g.)	Yes ☐	No ☒
	If "Yes," note the specific changes in the grid below.		

Current			*Proposed*			
Prefix & Nmbr	Credit Hrs	Title	*Prefix & Nmbr*	*Credit Hrs*	*Title*	*Course Status*[9]
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....

[7] Use the drop-down list to indicate if the course is a new course ("new"), an existing course that will change ("change"), or if the course is an existing course that will not change ("no change").
[8] Use the drop-down list to indicate if the course is new, exists but will change, or exists but will not change.
[9] Use the drop-down list to indicate if the course is new, exists but will change, or exists but will not change.

						Select one....
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....
						Select one....

5f	Provide the Bulletin language for major core course requirements.

5g	Will the guided electives change? (If "Yes," indicate and note the specific changes in the grid below. If "No," indicate and proceed to question 5i.)	Yes ☒	No ☐

Current			*Proposed*			
Prefix & Nmbr	Credit Hrs	Title	*Prefix & Nmbr*	*Credit Hrs*	*Title*	*Course Status*[10]
		see bulletin for full list of guided electives for general biology track				Select one....
			WRD 305	3	Writing Public Science	No Change
			WRD 310	3	Writing in the Natural Sciences	No Change
						Select one....
						Select one....
						Select one....

5h	Provide the Bulletin language for guided electives.
	Add the following courses to the Acceptable list of upper-level electives for the General Biology track ONLY: WRD 305 OR WRD 310 (all other courses on the list stay the same)

5i	Will the free electives change? (If "Yes," indicate and note the specific changes in the space below. If "No," indicate and proceed to question 5j.)	Yes ☐	No ☒

5j	Does the proposed change affect any track(s)? (If "Yes," note the specific changes using the grid below. If "No," proceed to question 6.)	Yes ☒	No ☐
	If more than one track is affected, click HERE for a template. Append a PDF for each affected track to the end of this form.		

Track Name:	General Biology	☐ New Track	☒ Changed Track	☐ Deleted Track

[10] Use the drop-down list to indicate if the course is new, exists but will change, or exists but will not change.

Current			*Proposed*			
Prefix & Nmbr	Credit Hrs	Title	*Prefix & Nmbr*	*Credit Hrs*	*Title*	*Course Status*[11]
		See full list	WRD 305	3	Writing Public Science	No Change
			WRD 310	3	Writing in the Natural Sciences	No Change
						Select one....
						Select one....
						Select one....
						Select one....

5k	Provide the Bulletin language for the track.
	Add the following courses to the Acceptable list of upper-level electives for the General Biology track: WRD 305 OR WRD 310 (all other courses on the list stay the same)

6. Semester by Semester Program

List below the typical semester-by-semester program for the major. If multiple tracks are available, click HERE for a template for additional tracks and append a PDF of each track's courses to the end of this form.

YEAR 1 – FALL: (e.g. "BIO 103; 3 credits")	see 4 year plan attached	**YEAR 1 – SPRING:**	
YEAR 2 - FALL :		**YEAR 2 – SPRING:**	
YEAR 3 - FALL:		**YEAR 3 - SPRING:**	
YEAR 4 - FALL:		**YEAR 4 - SPRING:**	

7. Approvals/Reviews

Information below does not supersede the requirement for individual letters of support from educational unit administrators and verification of faculty support (typically takes the form of meeting minutes).

In addition to the information below, attach documentation of department and college approval. This typically takes the form of meeting minutes but may also be an email from the unit head reporting department- and college-level votes.

	Reviewing Group Name	**Date Approved**	**Contact Person Name/Phone/Email**
7a	(Within College)		
	Biology faculty	**11/2018**	**Jennifer Osterhage / 257-9322 / jennifer.osterhage@uky.edu**
	WRD faculty	**11/2018**	**Jeff Rice / / jrice@uky.edu**
			/ /
			/ /
7b	(Collaborating and/or Affected Units)		
	WRD	**11/2018**	**Jeff Rice / / jrice@uky.edu**

[11] Use the drop-down list to indicate if the course is new, exists but will change, or exists but will not change.

			/ /
			/ /
			/ /
			/ /

7c	(Senate Academic Council)	**Date Approved**	**Contact Person Name**
	Health Care Colleges Council (if applicable)		
	Undergraduate Council	3/5/19	Joanie Ett-Mims

Overview of GCCR Changes

Biology B.S. and B.A. degree

Graduation Composition and Communication Requirement (GCCR)

In order to meet the Graduation Composition and Communication Requirement (GCCR), students must successfully complete BOTH BIO 425 to fulfill the oral communication requirement AND one course from the list below to fulfill the written communication requirement.

In order to receive GCCR credit a student must:

(a) Earn an average grade of C or better on all GCCR assignments and

(b) Have completed at least 30 credit hours of college-level coursework prior to registering for the course.

Oral Communication Requirement	Credit Hours
BIO 425 (Biology Seminar)	1

Written Communication Requirement

Choose one course from the following 8 options:

BIO 398 (Research and Writing in Biology)	1-3
BIO 404 (Advanced Genetics)	3
BIO 405 (Human Genetics)	3
BIO 418 (Ecological Genetics)	3
BIO 430G (Plant Physiology)	4
BIO 445 (The Biology of Sex)	3
WRD 305 (Writing Public Science)	3
WRD 310 (Writing in the Natural Sciences)	3

Proposal to revise the mechanisms for fulfilling the written GCCR requirement in Biology courses

Background/Rationale:

The GCCR requirement was adopted by the university in 2013. To satisfy the GCCR, students must earn an average grade of C or better on the designated Composition and Communication (C&C) intensive assignments produced in any given course designated as fulfilling some or all of the GCCR. The requirements for GCCR courses include:

• at least 4500 words of English composition (approximately 15 double-spaced pages);

• a formal oral assignment or a visual assignment;

• an assignment demonstrating information literacy in the discipline;

• a draft/feedback/revision process on GCCR assignments. The program requirements for the GCCR include:

• at least one specific Program Student Learning Outcome for C&C outcomes;

• a plan for assessing both the writing and oral or visual components of the GCCR;

• clear goals, rubrics, and revision plans for GCCR implementation.

Since the adoption of the GCCR, the written portion of the requirement has been fulfilled by over 90% of Biology majors through writing assignments in the lab portion of BIO 350 (Animal Physiology). BIO 430G (Plant Physiology) and WRD 204 (Technical Writing) are also approved to fulfill the GCCR requirement, but fewer than 10% of our majors utilize these options to fulfill the requirement. **The oral communication portion of the requirement is fulfilled through the BIO 425 seminar course, required of all Biology majors.**

Current Challenges:

The large number of students fulfilling the GCCR requirement in a single course has been a significant challenge, especially for graduate students and faculty involved in the course. Faculty members have made a valiant effort to streamline and improve the writing assignments in the course, but two major issues persist:

1. The amount of writing required, combined with the requirement for feedback, puts an undue burden on teaching assistants and faculty in the course. Each teaching assistant is responsible for giving feedback and evaluating the writing assignments for approximately 36 students each semester (around 840 pages of student work). In addition to the time necessary for grading, graduate students require additional training to maximize their feedback and evaluation skills. Faculty members are responsible for TA training, developing detailed rubrics, monitoring of grading across sections, and responding to instances of plagiarism.

2. Because of the significant commitment required to fulfill the GCCR, the number of lab exercises in BIO 350 has been reduced and the flexibility to adapt the course to best achieve non-GCCR learning outcomes has been lost. In addition, the fact that all students complete the same report means that they do not have the flexibility to tailor their GCCR experience to their specific interests and goals. This may also increase instances of plagiarism.

Current proposal

The Undergraduate Affairs Committee moves to remove the burden of GGCR fulfillment from BIO 350, and instead allow students to meet the written portion of the requirement through one of many options.

BIO 398 (Research and Writing in Biology): At the October 2018 faculty meeting, we approved a new course that is equivalent to BIO 395 except that it will contain a writing requirement that fulfills the GCCR. The degree audit system cannot distinguish between GCCR and non-GCCR sections of the same course, necessitating the need for a new course. This new course number would also ensure that all students completing independent research would only have to fulfill the GCCR requirement once (the semester they choose to register for BIO 398). All students enrolled in BIO 398 would be required to write a total of 4500 words (approximately 15 pages) over the course of the semester. Writing assignments could take the form of one large paper or multiple smaller assignments, including posters.

A qualifying upper-level BIO course: students could fulfill the GCCR requirement by taking a course from the following list:

- BIO 404 (Advanced Genetics)
- BIO 405 (Human Genetics)
- BIO 418 (Ecological Genetics)
- BIO 430G (Plant Physiology)
- BIO 445 (Biology of Sex)

WRD 310 (Writing in the Natural Sciences) or WRD 305 (Writing Public Science): Sections of these existing courses will be adapted to fit the needs of Biology majors in close consultation with Biology faculty. WRD 310 is currently used by Chemistry and Engineering to fulfill the GCCR. Students would receive upper-level Biology elective credit for completion of WRD 310 OR WRD 305 (i.e. these will be added to the acceptable electives for the general biology track). This is a necessity since our major is already a full 120 credit hours.

Students will continue to fulfill the oral communication portion of the requirement through BIO 425.

Note: Because all of these courses will count towards the major, we are NOT adding any additional credit hours to our degree requirements.

Advantages of current proposal:

1. Students tailor their experience to their specific interests/goals.

Biology majors are not a homogeneous population, and the one-size-fits-all approach to the GCCR may not best serve the needs of our diverse student body. With this suite of three options, students will be able to target which GCCR aligns with their professional goals:

- The BIO 398 option: This would be ideal for the majority of our students who are aiming for professional careers in the life sciences. They would gain experience in primary-literature style scientific writing using their own data/project. This approach also adds a measure of consistency to the grading across BIO 398 sections.

- Upper-level BIO elective option: this option allows students to choose courses based on their interests; most of the courses that include a paper requirement allow students to pick their own topic, which will encourage students to delve deeply into a subject of their choosing.

- WRD 310/305 option: these courses would be ideal for students not planning to enter fields that require primary literature style writing. Instead, the students would gain valuable skills in communicating science to non-experts. In both of these courses, students can tailor their writing assignments to fit their interests.

2. Feedback and evaluation performed by faculty experts

3. Removes burden from BIO 350 faculty and teaching assistants and allows for increased flexibility in the BIO 350 course

Biology major demographic information

Number of students graduating with a Biology major in the 2017/2018 academic year: **209**

Number of Biology majors in the 2017-18 academic year who…

Completed BIO 395 with a mentor in the Biology department: **62**

Completed BIO 395 with a mentor outside the Biology department: **79**

# of Biology majors in the 2017-18 academic year enrolled in:

BIO 430G: **9**

BIO 404**: 7**

BIO 405: **13**

BIO 445: **13**

Note: We anticipate the enrollments of the 400-level BIO courses to increase somewhat if this proposal passes and given our recent program change that students must take a minimum number of BIO-prefix electives.

Tentative Enrollments

Based on the demographic information above, we anticipate that, PER ACADEMIC YEAR, approximately:

- **75** BIO majors would fulfill the GCCR through BIO 398 (this represents 60% of students who currently enroll in BIO 395)
- **75** majors would fulfill the requirement through an upper-level BIO course
- The remaining **~60-70** majors would fulfill the requirement through WRD 310 or 305. We have approval from the WRD department that they can accommodate this many students.

Other Details

1. By default, all faculty members who accept BIO 398 students would be required to give feedback and grades for GCCR writing assignments. The GCCR assignments should count for a minimum percentage of the final grade in all sections of the course. GCCR requirements will be included in the BIO 398 contract.

2. If faculty do not wish to participate in the GCCR requirement, students interested in their lab could register for the appropriate independent research course through their department (ex: ANA 395) or for BIO 395.

3. The WRD 310 course (Writing in the Natural Sciences) is already on the books and approved as a GCCR course, but is not currently approved to fulfill the Biology GCCR. WRD 305 will need to be approved to fulfill the Biology GCCR. An Undergraduate Affairs committee member will serve as a liaison between WRD and

Biology faculty, and syllabi and course assignments will be approved by vote of the Undergraduate Affairs Committee and department chair.

4. In order to keep the required hours for the Biology major to 120, WRD 310 OR 305 will be allowed to count as a BIO elective. WRD 305 OR WRD 310 will be added to the acceptable electives for the general biology track.

GCCR Form

Graduation Composition and Communication Requirement (GCCR)
GCCR PROPOSAL AND CHANGE UNDERGRADUATE PROGRAM FORM

I. General Information:

College:	Arts and Sciences	Department (Full name):	Biology
Major Name (full name please):	Biology	Degree Title:	BS
Formal Option(s), if any:	———	Specialty Field w/in Formal Options, if any:	all

Requested Effective Date: ☐ Semester after approval OR ☒ Specific Date[1]: Fall 2019

Contact Person:	Jennifer Osterhage	Phone:	257-9322	Email:	jennifer.osterhage@uky.edu

II. Parameters of the Graduation Composition and Communication Requirement (GCCR):

The new GCCR replaces the old Graduation Writing Requirement. It is fulfilled by a course or courses specified within a B.A./B.S. degree program. As outlined in Senate Rule 5.4.3.1, the GCCR stipulates that students must successfully complete this requirement after achieving sophomore status and prior to graduation. To satisfy the GCCR, students must earn an average grade of C or better on the designated Composition and Communication (C&C) intensive assignments produced in any given course designated as fulfilling some or all of the GCCR. The requirements for GCCR courses include:

- at least 4500 words of English composition (approximately 15 pages total);
- a formal oral assignment *or* a visual assignment;
- an assignment demonstrating information literacy in the discipline;
- a draft/feedback/revision process on GCCR assignments.

The program requirements for the GCCR include:

- at least one specific Program Student Learning Outcome for C&C outcomes;
- a plan for assessing both the writing and oral *or* visual components of the GCCR;
- clear goals, rubrics, and revision plans for GCCR implementation.

Upon GCCR approval, each program will have a version of the following specification listed with its Program Description in the University Bulletin:

> *"**Graduation Composition and Communication Requirement.** Students must complete the Graduation Composition and Communication Requirement as designated for this program. Please consult a college advisor or program advisor for details. See also 'Graduation Composition and Communication Requirement' on p. XX of this Bulletin."*

III. GCCR Information for this Program (by requirement):

A. *List the courses currently used to fulfill the old Graduation Writing Requirement:*

We are seeking to change the way that students fulfill the GCCR. Currently, the oral communication portion of the requirement is fulfilled by BIO 425 (Biology seminar), a required course for our major. We are not changing the way that students fulfill that portion of the requirement. The written communication portion of the requirement is currently fulfilled by two courses: BIO 350 (Animal Physiology) and BIO 430G (Plant Physiology). Students also have the option of taking WRD 204 to fulfill the entire GCCR, but very few of our students utilize this option. We would like to drop BIO 350 and WRD 204 as courses that can fulfill the requirement and instead allow students to fulfill the written requirement by choosing one course out of a list of eight.

B. *GCCR Program Outcomes and brief description:*

1. Please specify the Major/Program Student Learning Outcomes (SLOs) pertaining to Composition & Communication and the GCCR requirement. These are *program* outcomes, not *course* outcomes. Please specify the program-level SLOs for C&C in your program:

Given that we are expanding the ways in which students fulfill the GCCR, we have updated our SLO to the following: Outcome

[1] Programs are typically made effective for the semester following approval. Regardless of requested effective date, no program will be made effective unless all approvals are received.

#4 The presentation and discussion of biological research
Students will be able to present and discuss the concepts, methods, and results of biological research. They will be able to gather, synthesize, critically analyze, and integrate scientific research in one or more forms of scientific writing (e.g. traditional research paper, review article, or public science piece).

2. Please provide a short GCCR description for your majors (limit 1000 characters): Please explain the GCCR requirement in language appropriate for undergraduate majors to understand the specific parameters and justification of your program's GCCR implementation plan:

The GCCR requirement for Biology majors is designed to achieve maximum flexibility and the allow students to tailor their GCCR requirment to their specific interests. Students will fulfill the oral communication portion of the requirement of the GCCR through BIO 425 (Biology seminar). The Biology department offers at least 20 sections of the course each year, each with it's own subtitle, which allows student to choose the section that best fits their interests. Students will fulfill the written communication portion of the requirement by choosing one course from a list of eight (BIO 404, BIO 405, BIO 418, BIO 430G, BIO 445, WRD 305, or WRD 310) which again allows students to tailor their Biology curriculum to fit their interests.

See attached bulletin language

C. *Delivery and Content:*

1. Delivery specification: for your major/program, how will the GCCR be delivered? Please put an X next to the appropriate option. *(Note: it is strongly recommended that GCCR courses be housed within the degree program.)*	☐ a. Single required course within program
	☐ b. multiple required or optional courses within program
	☐ c. course or courses outside program (i.e., in another program)
	☒ d. combination of courses inside and outside program
	☐ e. other (please specify): _

2. Basic Course Information: Please provide the following information for course(s) used to satisfy the GCCR, either in whole or in part:

Course #1: Dept. prefix, number, and course title: BIO 398, Research and Writing in Biology

- new or existing course? new (*new courses should be accompanied by a New Course Proposal*)
  - ☒ *if a new course, check here that a New Course Proposal has been submitted for review via eCATS*
- required or optional? optional
- shared or cross-listed course? no
- projected enrollment per semester: 40

Course #2 (if applicable): Dept. prefix, number, and course title: BIO 405, Human Genetics

- new or existing course? existing (*new courses should be accompanied by a New Course Proposal*)
  - ☐ *if a new course, check here that a New Course Proposal has been submitted for review via eCATS*
- required or optional? optional
- shared or cross-listed course? no
- projected enrollment per semester: 20

Course #3 (if applicable): Dept. prefix, number, and course title: BIO 404; Advanced Genetics

- new or existing course? existing (*new courses should be accompanied by a New Course Proposal*)
  - ☐ *if a new course, check here that a New Course Proposal has been submitted for review via eCATS*
- required or optional? optional
- shared or cross-listed course? no
- projected enrollment per semester: 10

3. Shared courses: If the GCCR course(s) is/are shared from *outside* the program, please specify the related department or program that will be delivering the course(s). Please provide the following:

- **Contact information of providing program:**

Writing, Rhetoric, and Digital Studies, Jeff Rice, Chair, j.rice@uky.edu

- **Resources:** what are the resource implications for the proposed GCCR course(s), including any projected budget or staffing needs? If multiple units/programs will collaborate in offering the GCCR course(s), please specify the resource contribution of each participating program.

We don't anticipate any extra resources being required for this change. BIO 398 is the only new course being proposed, and students will enroll in this course instead of BIO 395 - i.e. we don't anticipate more students enrolling in independent research and the resources are already in place. The other courses are already existing - we are just adding the GCCR writing component to those in which it hasn't already been approved. WRD faculty have verified that Biology majors can be accommodated into existing sections of WRD 305 and 310, and that they would add another section if necessary. See detailed proposal for estimates of number of students completing the GCCR through each option.

- **Memorandum of Understanding/Letter of Agreement**: Attach formal documentation of agreement between the providing and receiving programs, specifying the delivery mechanisms and resources allocated for the specified GCCR course(s) in the respective programs (include with attachments).

Date of agreement: November 5, 2018

4. Syllabi: Please provide a sample syllabus for each course that will be designated to fulfill the GCCR. Make sure the following things are clearly indicated on the syllabi for ease of review and approval (check off each):

- the GCCR assignments are highlighted in the syllabus and course calendar;
- the GCCR assignments meet the minimum workload requirements as specified by the Senate Rules for GCCR courses (please click here, click on the top bullet for "USR in Microsoft Word (changes incorporated)" and use CTRL+F to find section 5.4.3.1);
- the elements are specified in the syllabus that fulfill the GCCR requirement for a clear draft/feedback/revision process;
- the grade level requirements for the GCCR are specified on the syllabus (i.e., an average of C or better is required on GCCR assignments for credit);
- the course or sequence of courses are specified to be completed after the first year (i.e. to be completed after completing 30 credit hours) for GCCR credit;
- the course syllabus specifies "This course provides full/partial GCCR credit for the XXX major/program"
  - if the course provides partial GCCR credit, the fulfilled portion of the GCCR must be specified and the other components of the GCCR for the program must be specified: e.g. "This course provides partial credit for the written component of the GCCR for the XXX major/program in conjunction with Course 2"

5. Instructional plan: Summarize the instructional plan for teaching the C&C skills specified in the program SLOs and delivered in the course(s). Include the following information in **brief** statements (1000 characters or less). Information can be cut-and-pasted from the relevant sample syllabus with indications **where** on the syllabus it is found:

- overview of delivery model: summarize how the GCCR will be delivered for **all** program majors: explain how the delivery model is appropriate for the major/program and how it is offered at an appropriate level (e.g. required course(s), capstone course, skills practicum sequence of courses, etc.):

As before, students will earn the communication portion of the requirement in BIO 425. This course requires at least two 10-15 minute oral presentations, with faculty and peer feedback given after the first presentation. This course is taken by junior and senior biology majors. The written component will be earned in one of eight courses, all offered at or above the 300 level (indicating an appropriate level of rigor). Although the assignments differ between courses, most courses will require a primary literature-style assignment and/or a review-type assignment. The main advantages this proposal is that students tailor their GCCR experience to their specific interests/goals and that feedback and evaluation provided by faculty members (not TAs).

- assignments: overview or list of the assignments to be required for the GCCR (e.g. papers, reports, presentations, videos, etc.), with a summary of how these GCCR assignments appropriately meet the disciplinary and professional expectations of the major/program:

See syllabi for details. In BIO 425, two oral presentations are required. In courses that fulfill the written requirement, assignments will vary, but all assignments require discipline-specific scientific writing in at least one form (popular science articles, review-type articles, grant proposals, primary literature-type articles), etc).

- revision: description of the draft/feedback/revision plan for the GCCR assignments (e.g. peer review with instructor grading & feedback; essay drafting with mandatory revision; peer presentations; etc.):

See syllabi for details. Faculty members will evaluate drafts and provide feedback for GCCR assignments.

- other information helpful for reviewing the proposal:

WRD 310, BIO 430G, and BIO 425 have previously been approved as fulfilling either the oral or written communication portions of the GCCR. Syllabi, with relevant portions highlighted, are included for all courses not previously approved as fulfilling the GCCr.

D. Assessment:

In addition to providing the relevant program-level SLOs under III.B, please specify the assessment plan at the program level for the proposed course(s) and content. Provide the following:

- specify the assessment schedule (e.g., every 3 semesters; biennially):

The SLO will be assessed every three years, but data will be gathered each semester. We will use a Canvas shell to gather writing samples from BIO 398, and instructors will provide samples of student writing directly to the DUS for all other courses. Samples of student writing artifacts will be evaluated using the Written Communication VALUE rubric developed by the Association of American Colleges and Universities (AACU). Student presentations will be evaluated using the Oral Communication VALUE rubric developed by the AACU. Writing and presentation samples will be evaluated by multiple faculty members in the Biology department. Cohen's Kappa statistic will be utilized to determine interrater reliabiligy. Results will be synthesized by the Director of Undergraduate Studies and the Biology Undergraduate Affairs Committee.

- identify the internal assessment authority (e.g. curriculum committee, Undergraduate Studies Committee):

The Undergraduate Affairs Committee, chaired by the Director of Undergraduate Studies, will conduct all assessments.

- if the GCCR course(s) is/are shared, specify the assessment relationship between the providing and receiving programs: explain how the assessment standards of the receiving program will be implemented for the provided course(s):

Writing samples from WRD 305 and 310 will be sent to the Biology Undergraduate Affairs Committee for independent assessment using the written communication VALUE rubric (see MOA). The WRD department also conducts its own assessment of student writing in these courses, which will be shared with the Biology faculty.

Signature Routing Log

General Information:

GCCR Proposal Name (course prefix & number, program major & degree):	
Contact Person Name:	Jennifer Osterhage
Phone:	257-9322
Email:	jennifer.osterhage@uky.edu

Instructions:
Identify the groups or individuals reviewing the proposal; record the date of review; provide a contact person for each entry. On the approval process, please note:

- Proposals approved by Programs and Colleges will proceed to the GCCR Advisory Committee and Undergraduate Council for review and approval, and then they will be sent to the Senate Council Office. Program changes will then be posted on a web transmittal for final Senate approval.
- New Course Proposals for the GCCR will still require review and approval by the Undergraduate Council. This review will run parallel to GCCR Program Change review.
- In cases where new GCCR courses will be under review for implementation after Fall 2014, related GCCR Program Changes can still be approved for Fall 2014 as noted "*pending approval of appropriate GCCR courses."*

Internal College Reviews and Course Sharing and Cross-listing Reviews:

Reviewing Group	Date Reviewed	Contact Person (name/phone/email)
Home Program *review by Chair or DUS, etc.*	11/2018	Jennifer Osterhage / 257-9322 / jennifer.osterhage@uky.edu
Providing Program *(if different from Home Program)*	11/2018	Jeff Rice / / j.rice@uky.edu
Cross-listing Program *(if applicable)*		/ /
College Dean		/ /
		/ /

Administrative Reviews:

Reviewing Group	Date Approved	Approval of Revision/ Pending Approval[2]
GCCR Advisory Committee		

Comments:

[2] *Use this space to indicate approval of revisions made subsequent to that group's review, if deemed necessary by the revising group; and/or any Program Change approvals with GCCR course approvals pending.*

Course #4 (if applicable): Dept. prefix, number, and course title: BIO 418, Ecological Genetics

- new or existing course? existi (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? optio
- shared or cross-listed course? no
- projected enrollment per semester: 10-2(

Course #5 (if applicable): Dept. prefix, number, and course title: BIO 445, The Biology of Sex

- new or existing course? existi (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? optio
- shared or cross-listed course? no
- projected enrollment per semester: 10-1[illegible]

Course #6 (if applicable): Dept. prefix, number, and course title: BIO 430G Plant Physiology

- new or existing course? existi (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? optio
- shared or cross-listed course? no
- projected enrollment per semester: 10-1[illegible]

Course #7 (if applicable): Dept. prefix, number, and course title: BIO 425, Biology Seminar

- new or existing course? existi (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? requi
- shared or cross-listed course? no
- projected enrollment per semester: 100-1

Course #8 (if applicable): Dept. prefix, number, and course title: WRD 305, Writing Public Science

- new or existing course? existi (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? optio
- shared or cross-listed course? no
- projected enrollment per semester: 10-2(

Course #9 (if applicable): Dept. prefix, number, and course title: WRD 310, Writing in the Natural Sciences

- new or existing course? existi (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? optio
- shared or cross-listed course? no
- projected enrollment per semester: 30-5(

Course #10 (if applicable): Dept. prefix, number, and course title:

- new or existing course? _____ (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? _____
- shared or cross-listed course? _____
- projected enrollment per semester: _____

Course #11 (if applicable): Dept. prefix, number, and course title: _____

- new or existing course? _____ (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? _____
- shared or cross-listed course? _____
- projected enrollment per semester: _____

Course #12 (if applicable): Dept. prefix, number, and course title: _____

- new or existing course? _____ (*new courses should be accompanied by a New Course Proposal*)
  - *if a new course, check here that a New Course Proposal has been submitted for review via Curriculog*
- required or optional? _____
- shared or cross-listed course? _____
- projected enrollment per semester: _____

GCCR Syllabus

BIO 404- Advanced Genetics- Fall 2019. **LECTURE:** TR, 11:00 – 12:15 P.M.

103 Jacobs Science Bldg.

INSTRUCTOR: Dr. Doug Harrison Office: 300 T.H. Morgan Bldg.
Tel.: 257-6275 e-mail: dough@uky.edu
Office Hours: By appointment

COURSE DESCRIPTION:
This course in contemporary genetic analysis emphasizes experimental approaches to biological questions in a variety of eukaryotic organisms. The course includes discussion of the application of methodologies spanning a wide range of genetics, including classical, molecular, quantitative and genome-wide approaches. Primary scientific literature is investigated to understand the development and application of these methods. The course is intended to provide a good working understanding of current genetic techniques, how to select appropriate approaches to modern biological problems, and how to interpret results of genetic analyses.

This course fulfills the written component of the Graduation Composition and Communication Requirement (GCCR). In order to fully meet the GCCR, students must successfully complete BOTH this course (or another course from an approved list) AND BIO 425, which fulfills the oral communication component of the GCCR. In order to receive GCCR credit a student must:
(a) Earn an average grade of C or better on all GCCR assignments and
(b) Have completed at least 30 credit hours of college-level coursework prior to registering for the course.

COURSE GOALS/OBJECTIVES:
This is a three credit upper level course in contemporary genetic analysis. The emphasis of the course will be on experimental approaches using model eukaryotes, relying on scientific literature and web resources. It is expected that the course should not only familiarize you with current genetic and genomic techniques, but to provide you with experience in applying those techniques to modern problems in biology. Additionally, graduate students will write a research proposal with the goal of learning to assemble a logical research plan using genetic approaches.

STUDENT LEARNING OUTCOMES: It is anticipated that at the end of the course, students will be able to:

1. Explain mutations, mutagenesis, and gene manipulation methodologies and apply these techniques to address specific biological questions
2. Describe how genes can interact and apply that knowledge to recognize specific types of interactions based on genetic behaviors
3. Apply knowledge of genetic tools used for genome-wide analysis to address specific biological questions
4. Demonstrate an understanding of genetic mapping tools and ability to apply these techniques to address specific biological questions
5. Demonstrate an understanding of basic methodologies for quantitative trait analysis and ability to apply these techniques to address specific biological questions
6. Identify a relevant contemporary biological question, research appropriate genetic approaches, and design an experimental plan to investigate that question.
7. Synthesize course concepts in a scientific document that is clear, logical, and uses appropriate terminology.

PREREQUISITES: BIO 304 (Introductory Genetics) or equivalent or consent of the instructor is required. BIO 315 (Cell Biology) or equivalent is recommended, but not required.

OFFICE HOURS/CONSULTATION: This course will involve frequent required consultations (for proposal preparation), as well as meetings for any other matters that students wish to discuss. Rather than formal office hours, students should contact the instructor for appointments.

TEXT/REFERENCE MATERIALS: There is no required textbook. A basic genetics or molecular genetics text will be a useful general reference. Scientific papers and web resources will be extensively used. Some of the required journal articles may be authored by researchers at this institution. Note that such papers are a standard mechanism for dissemination of scientific information and that the authors receive no compensation as a result of assigning their reading in this class. Reference lists or readings will be posted on the course Canvas site; students are expected to read required references before class so that they may participate fully in the discussion of course material.

WEB SITE: Course materials and assignments will be posted on Canvas. It is the responsibility of the student to follow posted announcements and assignments through Canvas. It is recommended that students configure Canvas notifications so as to receive updated course information and reminders as soon as available and through an email address or notification system that they monitor frequently.

GRADES:

Points will be scored for activities as follows:

Activity	
First exam	100 points
Second exam	100
Third exam	100
Research proposal	120
Summaries & Homework	60
Attendance/Class Participation	40
Total	520 points

The final grade will be determined by the percentage of earned points (that is, total points earned divided by the total possible points). The final grade scale will be:

A (100-90%), B (89-80%), C (79-70%), D (69-60%), E (<60%).

Undergraduates will be informed of their current progress based on the criteria above before the midterm date of the semester.

EXAMS will be composed primarily of essay and short-answer questions derived from the class discussions and readings. The three exams will be weighted equally and the last exam will not be cumulative. Students who miss an exam due to an excused absence will take a make-up exam during the week preceeding final exam week. Students who miss the final exam due to an excused absence should discuss scheduling of a make-up exam as soon as possible. Students who miss an exam due to an unexcused absence will receive a 0 for that exam.

RESEARCH PROPOSAL. Each student will develop a research proposal in which genetic analysis is applied to a contemporary question in biology. Topics will be selected by the student in consultation with the course instructor. Acceptable topics may include, but are certainly not limited to, projects in which the student has participated as independent study (BIO 395 or similar). Preparation of the proposal will take place throughout the semester in four stages:

1) Selection, approval, and submission of a topic, including specific aims of the proposal
2) Detailed outline of the proposal that include a full listing of all points to be made in each section of the proposal (typically will be about two pages, single-spaced)

3) Full proposal (see format and contents below), including references (**minimum 2500 words**, maximum five single-spaced pages, not counting references)
4) Proposal resubmission, following modification based on instructor feedback

Each step of the assignment will be submitted via Canvas and examined by plagiarism detection software. Due dates for each step are noted in the attached class schedule. Written feedback for each submission will be provided by the instructor, but students are also strongly encouraged to make an appointment to meet with the instructor to discuss the proposal in more detail.

The proposal should be based on the format of a typical predoctoral fellowship application (NIH, NSF, etc.), except that it is limited to a total of 5 pages (not including references). Include the following sections (described in detail below): Specific Aims, Background & Significance, Research Design & Methods, and Literature Cited (but Literature Cited is not included in the page count). The suggested distribution for each section is approximately a half page for the Specific Aims and 2-2.5 pages each for the Background & Significance and Research Design & Methods. Your font size must be at least 11 point and your margins must be at least 1" on all sides.

Specific Aims

List the broad, long-term objectives and the goal of the specific research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Background and Significance

Briefly sketch the background leading to the present application, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. State concisely the importance and health relevance of the research described in this application. At least 10 primary literature references must be used.

Research Design and Methods

Describe the research design conceptual or clinical framework, procedures, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Describe any novel concepts, approaches, tools, or technologies for the proposed studies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative sequence or timetable for the project. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised.

PREPARATION, HOMEWORK, ATTENDANCE, AND PARTICIPATION. Each student is expected to attend and participate in classroom discussions on a daily basis. Involvement in discussions will require that students come to class prepared. In particular, students are expected to have read the assigned papers prior to class.

GCCR Summary Assignments: Assigned readings and dates for their discussion are posted on the course Canvas site and noted on the schedule at the end of this document. To promote preparation and practice scientific writing skills in a format that fulfills the GCCR writing requirement, students are required to write a brief summary (minimum of 250 words) of each paper designated as "required reading" and submit it on Canvas before the class in which the paper is discussed. **The summary must be written in the student's own words.** Any copying of description from another source, including the paper to be reviewed, will be considered plagiarism and subject to penalties as described below. At a minimum, summaries should address the following questions: 1) What was the major goal or hypothesis tested in the work described? 2) Briefly, what was the experimental approach used to test the

hypothesis or achieve the goal? 3) What were the results of the work and how were they interpreted by the authors? 4) What novel insights came from the work? 5) Why is this particular paper noteworthy in the field (can be good or bad reasons to note)? As per GCCR requirements, students will receive feedback on each summary that is designated as a GCCR assignment and will revise and resubmit those summaries (see highlighting in yellow on the schedule- a few summaries of assigned readings will not be resubmitted because they would conflict with timing of other major assignments). Students will have four days after instructor comments are posted on Canvas to revise and resubmit summaries. If the fourth day falls on a weekend, holiday, or exam day, students will have until the end of the next weekday to complete the submission. Summaries will be graded based on accuracy of the scientific description, clarity of the writing, and appropriate language, grammar, and spelling. For each summary 25% of the grade will be determined by the quality of the first draft and 75% on the second submission.

In addition to paper summaries, students will receive periodic homework assignments consisting of short answer or brief essay questions on the material. Homeworks are intended to reinforce important concepts and prepare students for the types of questions that will appear on exams. Late summaries and homeworks will be accepted up to two days after the due date, but with a 50% reduction in grade. Beyond two days late, assignments will not be accepted and a zero will given. In the case of late assignments associated with an excused absence, an appropriate alternative deadline will be determined in consultation with the instructor. The grade for this section of the course will be determined both on submitted summaries and homeworks, as well as in-class involvement in discussions. Attendance will be recorded and **each unexcused absence or tardy arrival will result in a reduction of the Attendance/Class Participation score. More than two unexcused absences will result in a 0 grade for this section.** See below for more details of the Attendance Policy.

ATTENDANCE POLICY: Because class participation is an integral and important part of this course, **attendance is mandatory**. Absences will be excused only under standard criteria stipulated in University regulations (see University Bulletin and SR: 5.2.4.1 and 5.2.4.2 for definitions). Students must notify the instructor of their absence prior to the absence or within **one week** after the absence. Students must submit any written documentation supporting their excused absence within **one week** after the absence. Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence. Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754). Students will be permitted one unexcused absence during the semester. In addition to potential influences on the class participation grade, **each unexcused absence beyond the first one** will reduce the final grade in the course by 5%. Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused) per university policy.

Make-ups for exams will be allowed only in cases of excused absences. The format of the make-up exam is at the discretion of the instructor, and may vary from that of the regularly scheduled exams.

POLICY ON ACADEMIC ACCOMMODATIONS: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide the instructor with a Letter of

Accommodation from the Disability Resource Center (MDS Bldg, Suite 407) for coordination of campus disability services available to students with disabilities.

POLICY ON RECORDING IN THE CLASSROOM: Echo360 will be used to record lectures in the course. Recordings will be available through the Canvas course portal. These recordings are intended aid students in clarifying or reinforcing lecture content and to provide a mechanism for students with a valid excused absence to keep up with material. It is not a substitute for in-person class participation (see policy on class attendance above). Personal video and audio recordings are not permitted during the class unless the student has received prior permission from the instructor. If permission is granted, recording of other students is prohibited Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the professor. . Any distribution of personal or Echo360 recordings is probhibited. All content for this course, including handouts, assignments, and powerpoint lectures are the intellectual property of the instructor and cannot be reproduced, sold, distributed, or used for any purpose other than educational work in this class without prior permission from the instructor.

POLICY ON ACADEMIC INTEGRITY, INCLUDING PLAGIARISM & OTHER FORMS OF CHEATING: It is acceptable to discuss papers, assignments, and course material with other students in the class, but it is expected that all **submitted** work in the class is entirely that of only that student. Academic honesty is required, and cheating and plagiarism will not be tolerated. According to the Encarta Dictionary, plagiarism is "copying what somebody else has written or taking somebody else's idea and trying to pass it off as original". If I had failed to cite the Encarta Dictionary in the previous sentence, that would have been plagiarism. It is not expected that every idea in your proposal will be completely original; you will be reading papers to come up with ideas about what to propose. It is OK to use those ideas if you express them in your own words and you reference the source of your ideas. You are expected to do both in the proposal assignment. There will be no assignments in this course in which it would be acceptable to simply "cut and paste" text or images from another source, whether you cite that source or not. The only exception will be the paper presentations, in which case it will be necessary to display figures from the paper for class discussion purposes.

Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The graded work of each student is expected to be the work of only that student. Academic honesty is required, and cheating, including plagiarism, will not be tolerated. Please note that there have been substantial changes to the University Senate Rules regarding procedures and penalties for academic offenses. Complete rules may be found at http://www.uky.edu/USC/New/SenateRulesMain.htm and have been summarized at http://www.chem.uky.edu/research/grossman/acadoffenses/index.htm. Also note that the University provides tools to prevent and detect plagiarism which may be used in this course. Written assignments may be submitted to SafeAssign, Turnitin, or similar software for assessment of originality. Your work will be compared with a collection of other previously submitted works from courses and those available on public web sites, including full text of journal articles. As a result of this submission, your work too will become part of their collection. In addition to these tools, standard search engines will also be used to randomly scan portions of submitted works. It is highly recommended that students review the paper "Plagiarism: What is it?" that may be found at the Ombud web site http://www.uky.edu/Ombud/Plagiarism.pdf. The Ombud web site also includes a link to a Prentice Hall Companion Website "Understanding Plagiarism" http://wps.prenhall.com/hss_understand_plagiarism_1/0,6622,427064-,00.html. If you have any questions about what constitutes plagiarism, you should discuss it with Dr. Harrison before turning in an

assignment. Ultimately, you are responsible for ensuring that all material you submit is your own and cannot be construed as plagiarism.

The minimum penalty for any form of cheating will be a zero on the assignment, but could be more severe, including an E in the course, suspension, or expulsion.

BIO 404S Advanced Genetic Analysis - Tentative Schedule - Fall 2019

Date	Topic	Assignments Due
8/22	Mutation and Variation	
8/27	Mutagenesis and Screens	Introduction summary
8/29		Mutagenesis summary
9/3	Transgenesis	Mutagenesis homework
9/5		Transgenesis summary
9/10	Gene Knock-outs	Transgenesis homework
9/12		Knock-out summary
9/17	Mosaic/Conditional Mutant Analysis	Knock-outs homework; **Proposal topic**
9/19		Conditional mutants summary
9/24	**First Exam**	
9/26	RNAi and Morpholinos	
10/1		RNAi summary
10/3	Gene Expression Systems	RNAi homework; **Proposal Outline**
10/8		Gene expression summary
10/10	Genetic Interactions	Gene expression homework
10/15		Genetic interaction summary
10/17	Gene Drive	Genetic interaction homework
10/22		Gene drive summary
10/24	Next Gen Sequencing & Genome-wide Analyses	Gene drive homework
10/29		
11/31	**Second Exam**	
11/5	Transcriptome analysis	**Full Proposal**
11/7		Transcriptomics summary
11/12	Markers Mapping and Linkage	Transcriptomics homework
11/14		Markers summary
11/19	Quantitative Trait Analysis	Markers homework
11/26		QTL summary
11/28	Genome-wide association studies	**Proposal resubmission**
12/3		GWAS summary
12/5	Medical Genetics & Genomics	QTL & GWAS Homework
12/12	**Third Exam at 10:30AM**	

-Proposal deadlines are marked in **bold**.
-Deadlines for GCCR assignments are highlighted. Resubmission of GCCR summaries is due within four days of posted instructor comments.

The schedule presented here is tentative and is subject to adjustment in both content and timing. Students will be informed of changes in class.

BIO 405
HUMAN GENETICS
Syllabus and Course Schedule

Instructor:	Dr. Ann C. Morris
	Associate Professor, Department of Biology
Office Address:	215 THM
Semester:	Spring 2019
Class times:	TR, 12:30-1:45 p.m.
Room:	JSB 114
E-mail:	ann.morris@uky.edu
Phone:	257-8823
Office hours:	Wednesdays 2-3 p.m. or by appointment

Course description: This course will survey selected topics relevant to the understanding of the diversity and complexity of human genetics and genetic diseases, and will explore some of the contemporary methodologies used to identify genes underlying human genetic diseases. This course will also cover modern methods for genome analysis since the human genome sequence forms the foundation of current human genetics in research and medicine.

This course fulfills the written component of the Graduation Composition and Communication Requirement (GCCR). In order to FULLY meet the GCCR, students must successfully complete both this course (or another course from an approved list) AND BIO 425, which fulfills the oral communication component of the GCCR. To receive GCCR credit, a student must:

1) Earn an average grade of C or better on the GCCR assignment, and

2) Have completed at least 30 credit hours of college-level coursework prior to registering for the course.

Prerequisites: BIO 304 (grade of C or better)

Student Learning Outcomes:

After completing this course, students should be able to:

1) Describe the complexities of human genetics and human genetic disease

2) Explain the genetic etiology of some common inherited diseases

3) Describe important features of the organization of the human genome

4) Examine the ways in which human gene expression is regulated

5) Discuss the techniques and strategies used to identify genes that underlie genetic disease

6) Gather, interpret and critically review primary research articles and scientific review articles, and integrate these ideas into a written term paper

7) Form opinions about genetic testing and personalized medicine

Optional materials: *Human Molecular Genetics*, by Tom Strachan and Andrew Read, 4th edition

Course Assignments

Your final grade will be based on the following:

Exams	70%
Paper	20% (5% for rough draft, 15% for final draft)
Participation	10% (5% for in-class discussion, 5% for final presentation)

Description of Course Assignments

Exams: There will be two in-class exams in this course. Exams will consist of several short-answer and essay questions.

Term paper:

Each student will write a roughly 15-page term paper (minimum 4,500 words, not including bibliography) on a topic relevant to this course. Topics will be selected in consultation with the course instructor. Papers will be written in the style of life sciences review articles. Research sources must include at least one primary paper from the scientific literature in addition to review articles. Topic proposals are due by Tuesday of week 8. A rough draft of the paper will be due on Thursday of week 13, and I will provide comments on this so that you can make revisions. The final draft of the paper is due the Sunday before finals week (by midnight).

Topic approval: Write a one paragraph summary describing your topic and a general outline of what you will cover in the paper**.** The outline should include the following:

- The relevance of your topic to human genetics
- How you will introduce the topic (i.e. your background information)
- A few of the specifics you will cover about the topic (e.g. for a genetic disease, you might want to cover the symptoms/etiology, what genes/mutations nderlie the disorder, what's known about how mutations in those genes result in the symptoms of the disease, and what (if any) treatments have been developed)
- Conclusions/future prospects – what are the outstanding questions that need to be answered about your topic and what future research needs to be done? If you are writing about a disease, what are the future prospects for treatment/therapy for patients
- What sources you will use: these can include websites, but some of your sources must be review articles and primary literature (use Pubmed and OMIM to help you find these)

Paper formatting guidelines:

Document format: 1 inch margins, 1.5 line spacing, 12 point font (either Times Roman or Arial)

Length: minimum 4,500 words, not including bibliography

No title page

References: Use in-text citations, with numbered citations in brackets. At least 10 primary literature articles must be referenced, but other publications may also be referenced.

Bibliography: follow PLOS journal reference formatting guidelines -- http://journals.plos.org/plosone/s/submission-guidelines#loc-references

***Paper Submission**:*

Both the rough draft and final versions of the paper should be submitted on Canvas, by midnight on the day they are due. Papers will be examined by plagiarism detection software. Comments on the rough draft will be returned within one week after submission.

Presentations: Each student will prepare a 5-minute presentation (with visual material such as Powerpoint slides) about his or her term paper topic to be shared with the class during the last two meetings.

Participation: Your participation grade will be determined based on your contributions to weekly discussions during lectures, and your end-of-term presentation about your paper topic. I will use the rubric included at the end of the syllabus to calculate your class discussion participation grade.

Course Grading

Final grades will be assigned using the scale below:

90 – 100% = A
80 – 89% = B
70 – 79% = C
60 – 69% = D
Below 60% = E

Final Exam Information

There is no final exam for this course. Your final term paper will be due the Sunday before final exam week.

Mid-term Grade: Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (http://www.uky.edu/registrar/calendar).

Tentative Course Schedule

** This schedule is tentative and subject to change. Any changes will be announced in class.

Week	Date	Topic
1	1/10; Thursday	Course overview; History of human genetics part 1
2	1/15; Tuesday	History of human genetics part 2
	1/17; Thursday	Review of meiosis
3	1/22; Tuesday	Chromosome structure and abnormalities
	1/24; Thursday	Human gene expression
4	1/29; Tuesday	Epigenetics and molecular pathology

	1/31; Thursday	*Case study 1: CF: The complexity of a human genetic disease*
5	2/5; Tuesday	Molecular methods of genome analysis
	2/7; Thursday	DNA sequencing, then and now
6	2/12; Tuesday	"-omics" approaches
	2/14; Thursday	*Paper discussion 1*
7	2/19; Tuesday	Non-coding RNA; Exam 1 review
	2/21; Thursday	**EXAM 1**
8	2/26; Tuesday	Mapping and cloning disease genes
	2/28; Thursday	Complex/multifactorial diseases; **term paper topics due**
9	3/5; Tuesday	Genome-wide association studies
	3/7; Thursday	Cancer genetics and genomics
10	3/11-3/15 SPRING BREAK	
11	3/19; Tuesday	Personalized and genomic medicine
	3/21; Thursday	*Paper discussion 2*
12	3/26; Tuesday	Pharmacogenetics
	3/28; Thursday	Genetic testing and diagnostics
13	4/2; Tuesday	**Guest speaker**: Miriam Robbins, Genetic Counselor
	4/4; Thursday	*Case study 2: Cancer genetics;* **paper rough draft due**
14	4/9; Tuesday	Genetic approaches to treating disease
	4/11; Thursday	Gene therapy; ethics in medical genetics
15	4/16; Tuesday	Class-chosen topic; Exam 2 review
	4/18; Thursday	**EXAM 2**
16	4/23; Tuesday	Student presentations
	4/25; Thursday	Student presentations
	4/28; Sunday	**final term paper due by midnight**

Submission of Assignments
Written assignments must be turned in to me by the end of class on the day they are due. The assignment grade will be dropped by 10% for every day the assignment is overdue.

Attendance Policy

Regular attendance at all class meetings is expected. You are responsible for any announcements made in class; there is no guarantee that I will email or post them on Canvas. Attendance will not be taken in class, but your participation during lectures will constitute a portion of your final grade. Your participation grade will be determined based on your contributions to weekly discussions during lectures, and your end-of-term presentation about your paper topic. I will use the rubric included at the end of the syllabus to calculate your class discussion participation grade.

Excused Absences
Students need to notify the professor of absences prior to class when possible. *Senate Rules 5.2.4.2* defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php.

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused) per University policy.

Per *Senate Rule 5.2.4.2*, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

Verification of Absences
Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

Missed exams: If you must miss one of the exams because of an excused absence, contact me immediately to schedule a make-up exam and present me with written validation for your excused absence. Valid excuses are as described in the University Bulletin.

If you know of university-sanctioned events (intercollegiate sports or other professional engagements) that will cause you to miss an exam, meet with me during the first two weeks of the semester to make alternate arrangements.

Academic Integrity and Cheating

All tests are "closed-book", meaning that you are not permitted to use written information in the form of notes, books, or "crib-notes" during these examinations. Behavior considered cheating in this course includes the following: 1) using notes of any kind during a test or exam; 2) copying from other students during tests or exams; 3) talking to other students during tests or exams; 4) handing in written work that is not your own work (i.e. plagiarism). The **minimum** penalty for these offenses is an "E" grade for the assignment.

Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. **The minimum penalty for a first offense is a zero on the assignment on which the offense occurred**. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see http://www.uky.edu/Faculty/Senate/ for the current set of *Senate Rules*) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to disability
If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource

Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/.

Other course policies

Canvas: Check Canvas for grades, announcements, reading assignments, and course information (e.g. syllabus, contact information, lecture and exam schedules). After each lecture, I will also post copies of the slides and other relevant material on Canvas.

The following rubric sets out the criteria upon which you will be evaluated: A guide to grading your class participation

A	B	C	D	F
• actively supports, engages and listens to peers (ongoing) • arrives fully prepared at almost every session • plays an active role in discussions (ongoing) • comments occasionally advance the level and depth of the dialogue • group dynamic and level of discussion are often better because of the student's presence	• makes a sincere effort to interact with peers (ongoing) • arrives mostly, if not fully, prepared (ongoing) • participates constructively in discussions (ongoing) • makes relevant comments based on the assigned material (ongoing) • group dynamic and level of discussion are occasionally better (never worse) because of the student's presence	• limited interaction with peers • preparation, and therefore level of participation, are both inconsistent • when prepared, participates constructively in discussions and makes relevant comments based on the assigned material • group dynamic and level of discussion are not affected by the student's presence	• virtually no interaction with peers • rarely prepared • rarely participates • comments are generally vague or drawn from outside of the assigned material • demonstrates a noticeable lack of interest (on occasion) • group dynamic and level of discussion are harmed by the student's presence	• no interaction with peers • never prepared • never participates • demonstrates a noticeable lack of interest in the material (ongoing) • group dynamic and level of discussion are significantly harmed by the student's presence

Adapted from: A. Chapnick. "Creating a class participation rubric" published in *Faculty Focus Special Report: Tips for Encouraging Student Participation in Classroom Discussions.* Magna Publications, M. Weimer, ed.

BIO 445
THE BIOLOGY OF SEX
Fall 2018

Course meeting times: MWF 9-9:50
Location: 116 Thomas Hunt Morgan
Instructor: Vincent M. Cassone, Ph.D.
Office: 101D TH Morgan
Office Hours: Wednesday 10 AM-11AM or by appointment
Phone: 257-6766
E-mail: Vincent.Cassone@uky.edu

Course Description
What is sex? Who has sex? What is sex for? This course is about the biological aspects of sex and gender, two of the most powerful forces in nature. We will explore the early evolution of sexual exchange of DNA and the emergence of genders. We will also discover the mechanisms by which gender is assigned across a vast array of different organisms and the amazing variability of sexual activity, ranging from duplicitous orchids to the rapacious passions of giant squid. Ultimately, we will explore the biological aspects of human sexuality in the context of its evolutionary origins and compare them to our closest relatives, the great apes. Readings in journal articles and a book will be complemented by short videos and discussions.

This course fulfills the written component of the Graduation Composition and Communication Requirement (GCCR) for Biology majors. In order to fully meet the GCCR, students must successfully complete BOTH this course (or another course from an approved list) AND BIO 425, which fulfills the oral communication component of the GCCR. In order to receive GCCR credit a student must:
(a) Earn an average grade of C or better on all GCCR assignments and
(b) Have completed at least 30 credit hours of college-level coursework prior to registering for the course.

Prerequisites
BIO 148 and 152 or equivalent, or consent of instructor

Student Learning Outcomes
After completing this course, students will be able to:
1) Explain the selective pressures that predispose organisms toward sexual reproduction and will be able to compare these pressures to those that favor asexual reproduction.
2) Describe meiosis and compare this process to mitosis. They will be able to describe how meiosis increases inter-individual variability.
3) Characterize the multiple pathways by which organisms determine different sexes.
4) Characterize the multiple pathways by which organisms differentiate into different sexes and describe examples where these processes may fail.
5) Identify the many sexual systems that are common among living things.
6) Identify and compare multiple modes of sexual behavior and conception.
7) Explain the evolution of primate, great ape and human sexuality.
8) Implement their understanding of the evolution, genetics and physiology of sexual determination, differentiation and behavior in the context of modern human society.
9) Identify a relevant contemporary biological question, research appropriate scientific approaches, and design an experimental plan to investigate that question.

10) Synthesize course concepts in a scientific document that is clear, logical, and uses appropriate terminology.

Required Materials: Journal Articles (provided on Canvas)

Dr. Tatiana's Sex Advice to All Creation: The Definitive Guide to the Evolutionary Biology of Sex by Olivia Judson

The Red Queen by Matt Ridley

Assignments

Exams: There will be three Mid-Term Examinations and a cumulative Final Exam in this Course. The exam dates are listed in the tentative schedule on the last pages of the syllabus. Each examination is worth 20 points for a total of 80 points. The examinations will be fill-in, short answer type exams.

Research proposal: Each student will develop a research proposal in which modern scientific analysis is applied to a contemporary question in Biology relating to our course. The research proposal is worth 20 points.

Preparation of the proposal will take place throughout the semester in four stages:

1) Selection, approval, and submission of a topic, including specific aims of the proposal
2) Detailed outline of the proposal that include a full listing of all points to be made in each section of the proposal (typically will be about two pages, single-spaced)
3) Full proposal (see format and contents below), including references (**minimum 4500 words**,, not counting references)
4) Proposal resubmission, following modification based on instructor feedback

Each step of the assignment will be submitted via Canvas and examined by plagiarism detection software. Due dates for each step are noted in the attached class schedule. Written feedback for each submission will be provided by the instructor, but students are also strongly encouraged to make an appointment to meet with the instructor to discuss the proposal in more detail.

The proposal should be based on the format of a typical predoctoral fellowship application (NIH, NSF, etc.) Include the following sections (described in detail below): Specific Aims, Background & Significance, Research Design & Methods, and Literature Cited (but Literature Cited is not included in the page count). Your font size must be at least 11 point and your margins must be at least 1" on all sides.

Specific Aims

List the broad, long-term objectives and the goal of the specific research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Background and Significance

Briefly sketch the background leading to the present application, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. State concisely the importance and health relevance of the research described in this application. At least 10 primary literature references must be used.

Research Design and Methods

Describe the research design conceptual or clinical framework, procedures, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe any new methodology and its advantage over existing methodologies. Describe any novel concepts, approaches, tools, or technologies for the proposed studies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative sequence or timetable for the project. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised.

Grades

Exam I	20 points
Exam II	20 points
Exam III	20 points
Final Exam	20 points
Research proposal	20 points
Total:	100 points

Grading Scale

A= 90-100 points
B= 80-89 points
C=70-79 points
D=60-69 points
E = 59 points or below

Mid-term grades for BIO 429 will be posted in myUK by the deadline established in the Academic Calendar (http://www.uky.edu/Registrar/AcademicCalendar.htm)

Attendance Policies

The lectures and class activities will cover materials that are related but not explicitly the same as the readings. Thus, attendance and class participation will be critical for your success. Thus, I expect you to do the readings *and* attend class.

Because class participation is an integral and important part of this course, **attendance is mandatory**. Students are allowed one unexcused absence per semester. Each *unexcused* absence past the first one will result in a 5% reduction from the final grade.

Students will not be penalized for an *excused* absence and will be given the opportunity to make up the work. Absences will be excused only under standard criteria stipulated in University regulations (see University Bulletin and SR: 5.2.4.1 and 5.2.4.2 for definitions). Students must notify the instructor of their absence prior to the absence or within **one week** following the period of the absence. Students must submit any written documentation supporting their excused absence within **one week** following the period of the absence. Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence. Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (859-257-2754).

Make-ups for exams will be allowed only in cases of excused absences. Make-up exams given during the final week of classes for those with excused absences. The format of the make-up exam is at the discretion of the instructor, and may vary from that of the regularly scheduled exams.

Excused Absences
Students need to notify the professor of absences prior to class when possible. *Senate Rules 5.2.4.2* defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php.

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused) per University policy.

Per *Senate Rule 5.2.4.2*, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

Verification of Absences
Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

Academic Integrity
Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see http://www.uky.edu/Faculty/Senate/ for the current set of *Senate Rules*) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where

students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

Accommodations due to disability
If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/.

Tentative Schedule

January	**Subject Area**	**Reading**
9	Organizational Meeting	
11	Genetics in a Nutshell	
14	DNA and mutation	
16	Mitosis and Meiosis	
18	Variability, Sex and the Red Queen	Otto and Lenormand, 2002
21	**Martin Luther King Day (no class)**	
23	Evolution before Sex	Redfield

25	Evolution after…. Proposal Topic Due	
28	A Sketch of the Battlefield	Judson Ch. 1
30	The Expense of the Damnable	Judson Ch. 2
February 1	**Examination Number 1**	
4	Fruits of Knowledge	Judson Ch. 3
6	Swords or Pistols	Judson Ch. 4
8		
11	How to Win even if you're a loser	Judson Ch. 5
13	How to Make Love to a Cannibal	Judson Ch. 6
15	Discussion	
18	Crimes of Passion	Judson Ch. 7
20	Hell Hath no Fury Proposal Outline Due	Judson Ch. 8
22		
25	Aphrodisiacs, Love Potions and Other Recipe's from Cupid's Kitchen	Judson Ch. 9
27	Till Death Do Us Part	Judson Ch. 10
March		
1	**Examination 2**	
4	The Fornications of Kings	Judson Ch. 11
6	Eve's Testicle	Judson Ch. 12
8	Discussion	
11	**Spring Break**	
13	**Spring Break**	
15	**Spring Break**	

18	Wholly Virgin	Judson Ch. 13
20	Opting Out: Giving up sex	
22	Opting Out: Giving up sex	
25	Opting Out: Giving up males	
27	Opting Out: Giving up males, but not sex	
29	Human Nature	Ridley Ch. 1
April		
1	The Enigma	Ridley Ch. 2
3	The Power of Parasites	Ridley Ch. 3
5	**Examination 3**	
8	Genetic Mutiny and Gender	Ridley Ch. 4
10	The Peacock's Tale	Ridley Ch. 5
12	Polygamy and the Nature of Men Full Proposal Due	Ridley Ch. 6
15	Monogamy and the Nature of Women	Ridley Ch. 7
17	Sexing the Mind	Ridley Ch. 8
19	The Uses of Beauty	Ridley Ch. 9
22	The Intellectual Chess Game Proposal Resubmission Due	Ridley Ch. 10
24 `	The Self-Domesticated Ape	Ridley Epilogue
26	Last Day Discussion	
29	No Class	
May		
1	**Final Examination**	

The schedule presented here is tentative and is subject to adjustment in both content and timing. Students will be informed of changes in class.

BIO 418: Ecological Genetics
Fall Semester 20XX
Tu/Th 10-12 pm; THM 108

Instructor: Dr. Catherine R. Linnen
Office Address: 204E Thomas Hunt Morgan
Email: catherine.linnen@uky.edu
Office Phone: 859-353-3160
Office Hours: By appointment

Course Description:
Ecological genetics resides at the interface of ecology, evolution, and genetics. At the heart of ecological genetics lie two components of adaptive evolution: genetic variation in phenotypic traits and natural selection on phenotypes. In this course, students will explore basic concepts in population and quantitative genetics and apply these to the analysis of genetic and phenotypic data. This course provides a conceptual link between courses focused on genetics and molecular biology and courses focused on whole organisms and their ecology.

For undergraduates enrolled in BIO 418, this course fulfills the written component of the Graduation Composition and Communication Requirement (GCCR). In order to fully meet the GCCR, students must successfully complete BOTH this course (or another course from an approved list) AND BIO 425, which fulfills the oral communication component of the GCCR. In order to receive GCCR credit a student must:

- Earn an average grade of C or better on all GCCR assignments and
- Have completed at least 30 credit hours of college-level coursework prior to registering for the course.

Prerequisites:
BIO 303 (Evolution) and BIO 304 (Genetics) or equivalent or consent of the instructor is required.

Student Learning Outcomes:
After completing this course, the student will be able to:

- Describe different types of genetic markers used in population genetic analysis and calculate summary statistics based on those markers.
- Test for deviations from Hardy-Weinberg equilibrium and list potential causes for those deviations.
- Predict how mutation, migration, genetic drift, and selection and various combinations of these evolutionary forces will impact allele frequencies.
- Understand the basics of coalescence theory and give examples of how it can be applied to the analysis of polymorphism data from natural populations.
- Analyze DNA polymorphism data to: detect and describe population structure, infer population history and demographic parameters, and detect deviations

from neutrality.
- Describe different forms of selection and estimate its strength on genotypes and phenotypes.
- Identify statistical associations between genetic markers and quantitative trait values using data from individuals with a known pedigree (QTL mapping) and individuals sampled from outbred populations (association mapping).
- Describe multiple approaches for estimating heritability and discuss the advantages and disadvantages of each approach.
- Evaluate reaction norms for evidence of genetic variance, phenotypic plasticity, and genotype-by-environment interactions.
- Gather, synthesize, and integrate primary research in the form of a review article.

Required Materials:
Conner, J.K. and D.L. Hartl. 2004. *A primer of ecological genetics*. Sinauer Associates.

PDFs for assigned readings will be made available on Canvas.

You will notice that several of the assigned PDFs are authored by me. Please note that **I do not benefit financially from the use of these papers in any way**. I have chosen to include them in the course because they fit the topics covered and I have access to the data for use in computer labs.

Supplementary Materials:
Although they are not required texts and I will not assign any readings from them, I also recommend the following texts as supplements to the course:

Hahn, M. 2019. *Molecular Population Genetics.* Oxford University Press.

Nielsen, R. and M. Slatkin. 2013. *An introduction to population genetics: theory and applications.* Sinauer Associates.

Hartl, D.L. and A.G. Clark. 2007. *Principles of population genetics, 4th edition.* Sinauer Associates.

Course Assignments and Grading:

The final grade will be based on performance in:

Midterm exam	25%
Final exam	25%
Lab exercises	20%
GCCR paper	20%
Participation	10%

The final grade scale will be:
A = 90 – 100%; **B** = 80 – 89.9%; **C** = 70 – 79.9%; **D** = 60 – 69.9%; **E** = <60%

Summary Description of Course Assignments:

Exams:

Two exams will be given: one midterm and one final. These exams will be in take-home format and will be based on required readings, lecture material, lab exercises, and discussions. **Students are expected to work independently on exams. Exams that are turned in late will receive a 25% reduction (based on total available points) in final score per day late. This same policy applies to all late assignments (lab exercises, papers).**

Lab exercises:

Students are expected to complete all lab exercises and to turn in short assignments related to these exercises.

Review paper:

Each student is expected to write a review paper that synthesizes research on a topic relevant to this course. To meet CGGR requirements, this review paper must be at least 4500 words (approximately 15 double-spaced pages) and demonstrate literacy in ecological genetics. Review articles are expected to summarize the current state of research, using at least 10 primary literature articles and other review articles when appropriate. Papers should be written in the standard life-sciences review article format (see pdf's of review articles discussed in class for examples). This assignment will be completed in three steps:

(1) A one-page summary of the proposed paper topic accompanied by a bibliography containing a minimum of 15 references due on xx/xx/xx. The paper proposal will account for 5% of your final paper grade.

(2) A draft of the full review paper (at least 4500 words) due on xx/xx/xx. This will account for 15% of your final paper grade.

(3) A revised version of the full review paper (at least 4500 words) due on xx/xx/xx. This will account for 80% of your final paper grade.

Final presentation (**optional**):

During the last week of class, each student is welcome to give a "lightning" talk (5 minutes) on their term paper for extra credit (up to 10 points added to the final paper grade, depending on the quality of the presentation).

Participation:

Participation grades will be based on attendance and participation in class discussions.

Course Policies:

Submission of Assignments:

All assignments should be submitted as hard copies either in class or in person (digital versions may be accepted under extenuating circumstances). Presentations will be given orally.

Except for excused absences (see "Course Policies" below), **attendance is mandatory**. Each unexcused absence will result in a loss of all participation and assignment points for that day. In addition, for the second and each subsequent unexcused absence, there will be an **additional 5-point reduction in the final grade** (above and beyond the missed participation and assignment points).

Attendance Policy:
Students are expected to attend and participate in all classes.

Excused Absences:
Students need to notify the professor of absences prior to class when possible. S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than 8/28/18. Information regarding dates of major religious holidays may be obtained through the religious liaison.

If a student misses more than 20% of the classes scheduled for the semester and those absences are excused, the student has a right to receive a "W" for the course.

Verification of Absences:
Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.4.2 states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness or death in the family. Appropriate notification of absences due to university-related trips is required prior to the absence. In terms of appropriate notification of illness, please note that I will accept only two "Tier 1" UHS excuses per student per semester. Subsequent absences will require a Tier 2 or Tier 3 document. Documentation of an excused absence will be **due within one week** after the student returns from the absence. Please note that I will take steps to confirm the authenticity of documentation.

Make-up opportunities:
For excused absences occurring on lab days, students will need to complete the lab assignment on their own and turn in the associated written assignment within **two weeks** of the missed class. For excused absences occurring on lecture days, attendance/participation points will be prorated based on remaining class periods.

Academic Integrity, Cheating, and Plagiarism:
PLAGIARISM and CHEATING are serious academic offenses.

The following excerpt is taken from the "Students Rights and Responsibilities Handbook, University of Kentucky" regarding cheating:

"Cheating is defined by its general usage. It includes, but is not limited to, the wrongful giving, taking or presenting any information or material by a student with the intent of aiding himself/herself or another on any academic work which is considered in any way in the determination of the final grade."

The following excerpt is taken from the "Students Rights and Responsibilities Handbook, University of Kentucky" regarding plagiarism:

"All academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to by the result of their own thought, research or self-expression.

When students submit work purporting to be their own, but which may in any way borrow ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work…..If the words of someone else are used, the student MUST put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content or phraseology intact is plagiaristic."

Charges of an academic offense will be made against any student that cheats or commits plagiarism. The **MINIMUM** penalty for such an offense is the assignment of a zero on the assignment on which the offense occurred. More severe penalties include suspension or dismissal from the University. **I have a zero-tolerance policy regarding academic offenses.**

Classroom Behavior, Civility, and Decorum:
The University, college and department all have a commitment to respect the dignity of all and to value differences among members of our academic community. There exists the role of discussion and debate in academic discovery and the right of all to respectfully disagree from time-to-time. Students clearly have the right to take reasoned exception and to voice opinions contrary to those offered by the instructor and/or other students (S.R. 6.1.2). Equally, a faculty member has the right – and the responsibility – to ensure that all academic discourse occurs in a context characterized by respect and civility. Obviously, the accepted level of civility would not include attacks of a personal nature or statements of denigrating another on the basis of race, sex, religion, sexual orientation, age, national/regional origin or other such irrelevant factors.

Accommodations due to disability:
If you have a documented disability that requires academic accommodations, you must provide me with a Letter of Accommodation from the Disability Resource Center (Suite 407 Multidisciplinary Science Center; Phone: 257-2754; Email: dtbeach1@uky.edu).

****Tentative Class Schedule****
(Disclaimer: actual lectures, labs, and reading assignments may differ from what is indicated here. All changes will be announced in class.)

Week 1 (August 23)
- Course overview

Week 2 (August 28, August 30)
- Lecture 1: Historical overview (Tuesday)
    - Assigned readings:
        - Chapter 1 in C&H
- Lecture 2: Genetic variation and recombination (Thursday)
    - Assigned readings:
        - Pgs. 9-24 and 157-160 in C&H
        - Davey, J.W. et al. 2011. Genome-wide genetic marker discovery and genotyping using next generation sequencing. *Nature Reviews Genetics* 12: 499-510.

Week 3 (September 4, September 6)
- Lecture 3: Hardy-Weinberg Equilibrium (Tuesday)
    - Assigned readings:
        - Pgs. 24-36 in C&H
- Lecture 4: Non-random mating (Thursday)
    - Assigned readings:
        - Pgs. 36-43 in C&H

Week 4 (September 11, 13)
- Lab 1: A brief introduction to the command line (OSX) and R (Tuesday)
    - Assigned readings:
        - None
    - Relevant programs:
        - Terminal
        - R/Rstudio
- Lab 2: Relatedness analysis in SPAGeDI (Thursday)
    - Assigned readings:
        - Empirical paper: Concannon et al. 2012. Kin selection may contribute to lek evolution and trait introgression across an avian hybrid zone. *Molecular Ecology* 21:1477-1486.
    - Relevant programs:
        - SPAGeDI

Week 5 (September 18, 20)

- Lecture 5: Genetic drift and mutation (Tuesday)
  - Assigned readings:
    - Pgs. 47-57 in C&H
- Lecture 6: Population subdivision and migration (Thursday)
  - Assigned readings:
    - Pgs. 57-66 and 84-86 in C&H
    - Wang and Bradburd 2014. Isolation by Environment. *Molecular Ecology* 23: 5649-5662.

Week 6 (September 25, 27)

- Lab 3: Pop-gen summary statistics for "old-school" data (Tuesday)
  - Assigned readings:
    - Empirical paper: Napolitano et al. 2015. Reduced genetic diversity and increased dispersal in guigna (*Leopardus guigna*) in Chilean fragmented landscapes. *Journal of Heredity* 106: 522-536.
  - Relevant programs:
    - Arlequin
    - Genepop
    - DNAsp
- Lab 4: Filtering and summarizing "next-gen" data (Thursday)
  - Assigned readings:
    - Andrews et al. 2016. Harnessing the power of RADseq for ecological and evolutionary genomics. *Nature Reviews Genetics* 17:81-92.
    - Empirical paper: Trucchi et al. 2016. Long live the alien: is high genetic diversity a pivotal aspect of crested porcupine (*Hystrix cristata*) long-lasting and successful invasion? *Molecular Ecology* 25: 3527-3539.
  - Relevant programs:
    - VCFtools
    - TBA

Week 7 (October 2, 4)—paper proposals due 10/2/18

- Lab 5: Analysis of discrete population structure (Tuesday); **paper proposals due**
  - Assigned readings:
    - Empirical paper: Konečný et al. 2013. Invasion genetics of the introduced black rat (*Rattus rattus*) in Senegal, West Africa. *Molecular Ecology* 22: 286-300.
  - Relevant programs:
    - STRUCTURE
    - Structure Harvester
    - CLUMPP
    - Distruct
- Lab 6: Analysis of continuous population structure [IBD vs. IBE] (Thursday)
  - Assigned readings:

        - Empirical paper: Manthey and Moyle 2015. Isolation by environment in White-breasted nuthatches (*Sitta carolinensis*) of the Madrean Archipelago sky islands: a landscape genomic approach
        - Meirmans, P. 2012. The trouble with isolation by distance. *Molecular Ecology* 21: 2839-2846.
    - Relevant programs:
        - BEDASSLE (R package)

Week 8 (October 9, 11)—take-home midterm distributed 10/9/18

- Lecture 7: Coalescence theory I; **Midterm distributed** (Tuesday)
    - Assigned readings:
        - Rosenberg and Nordborg. 2002. Genealogical trees, coalescent theory, and the analysis of genetic polymorphisms. *Nature Reviews Genetics* 3: 380-390.
- Lecture 8: Coalescence theory II (Thursday)
    - Assigned readings:
        - Rosenberg and Nordborg. 2002. Genealogical trees, coalescent theory, and the analysis of genetic polymorphisms. *Nature Reviews Genetics* 3: 380-390.

Week 9 (October 16, 18)—take-home midterm due 10/16/18

- Lab 7: Demographic analysis; **take-home midterm due** (Tuesday)
    - Assigned readings:
        - Empirical paper: Konečný et al. 2013. Invasion genetics of the introduced black rat (*Rattus rattus*) in Senegal, West Africa. *Molecular Ecology* 22: 286-300.
        - Sousa and Hey 2013. Understanding the origin of species with genome-scale data: modeling gene flow. *Nature Reviews Genetics* 14:404-415.
    - Relevant programs:
        - DIYABC
- Lecture 9: Natural selection (Thursday)
    - Assigned readings:
        - Pgs. 66-79 in C&H
        - Barrett et al. 2008. Natural selection on a major armor gene in threespine stickleback. *Science* 322: 355-257.

Week 10 (October 23, 25)

- Lecture 10: Multiple evolutionary forces (Tuesday)
    - Assigned readings:
        - Pgs. 79-89 in C&H
        - Hoekstra et al. 2004. Ecological genetics of adaptive color polymorphism in pocket mice: geographic variation in selected and neutral genes. *Evolution* 58: 1329-1341.
- Lecture 11: Neutral theory and tests of selection (Thursday)
    - Assigned readings:
        - Hahn 2019. *Molecular Population Genetics,* Chapter 1 (pdf)

        - Vitti et al. 2013. Detecting natural selection in genomic data. *Annual Review of Genetics* 47: 97-120.

Week 11 (October 30, November 1)

- Lab 8: Polymorphism-based tests of selection (Tuesday)
    - Assigned readings:
        - Pfeifer, SP et al. 2017. The evolutionary history of Nebraska deer mice: local adaptation in the face of strong gene flow. *Molecular Biology and Evolution* 35: 792-806.
    - Relevant programs:
        - VCFtools
        - Sweepfinder, Bayescan, selscan
        - Bayscenv
- Lab 9: Divergence-based tests of selection (Thursday)
    - Assigned readings:
        - Yang 1998. Likelihood ratio tests for detecting positive selection and application to primate lysozyme evolution. *MBE* 15: 568-573.
    - Relevant programs:
        - PAML

Week 12 (November 6, 8)

- Lecture 12: Quantitative traits and heritability (Tuesday)
    - Assigned readings:
        - Ch. 4 in C&H
- Lecture 13: Quantitative traits II (Thursday)
    - Assigned readings:
        - Ch. 5 in C&H (skip QTL mapping section)

Week 13 (November 13, 15) Rough draft (min 4500 words) of paper due November 15

- Lecture 14: Natural selection on phenotypes (Tuesday)
    - Assigned readings:
        - Ch. 6 in C&H
        - Linnen and Hoekstra 2009. Measuring natural selection on genotypes and phenotypes in the wild. *Cold Springs Harbor Symposia on Quantitative Biology* 74:155-168.
- Lecture 15: Linking genotype to phenotype to fitness (Thursday)
    - Assigned readings:
        - Pgs. 170-180 in C&H
        - Barrett and Hoekstra 2011. Molecular spandrels: tests of adaptation at the genetic level. *Nature Reviews Genetics* 12: 767-780.
        - Emilia Santos et al. 2015. Integrating evo-devo with ecology for a better understanding of phenotypic evolution. *Briefings in Functional Genomics* 14: 384-395.

Week 14 (November 20)

- Lab 10: QTL mapping (Tuesday)
    - Assigned readings:

        - Empirical: Weber et al. 2013. Discrete genetic modules are responsible for complex burrow evolution in *Peromyscus* mice. *Nature* 493: 402-406.
        - Mackay et al. 2009. The genetics of quantitative traits: challenges and prospects. *Nature Reviews Genetics* 10: 565-577.
    - Relevant programs:
        - Rqtl
- **No class (Happy Thanksgiving!!)**

Week 15 (November 27, 29)—papers due 11/29/18 (min. 4500 words)

- Lab 11: Association mapping (Tuesday)
    - Assigned readings:
        - Empirical paper: Linnen et al. 2013. Adaptive evolution of multiple traits through multiple mutations at a single gene. *Science* 339: 1312-1316.
        - Mackay et al. 2009. The genetics of quantitative traits: challenges and prospects. *Nature Reviews Genetics* 10: 565-577.
    - Relevant programs:
        - PLINK
        - GEMMA
- TBA; **papers due** (Thursday)

Week 16 (December 4, 6)—take-home final distributed on 12/6/18

- Student presentations I (Tuesday)
- Student presentations II; **take home final distributed** (Thursday)

Take-home final due Wednesday 12/12/18 in THM 304E by 4 PM

WRD 305 Writing Public Science

Instructor: Katherine Rogers-Carpenter
Meeting Place and Time: FB B9, T/R 12:30-1:45
Office Hours: T/R 10-12:00 and by appointment

Office: POT 1361
Dept. Phone: (859) 218-2867
Email: K.Rogers-Carpenter@uky.edu

Course Description:

Instruction and practice with popular audience genres and arguments in and about science, intended for both science and non-science majors.

Global warming. Vaccines. Epidemics. Chemical additives in food and drinks. These are science issues that generate extensive debate n in the popular press, on the web, and on social media. These are also complex issues that demand public science writing in order to clarify the issues from informed positions. Writing Public Science is designed for science and non-science majors interested in learning how to make complex scientific ideas accessible and exciting to a general audience. Throughout the semester, students will read a wide range of science writing including magazine articles, blogs, websites, advertisements, academic journal articles and books. In addition to studying how scientists write for their peers, the class will analyze how science writers like Carl Zimmer, Eric Larson, Mary Roach, and others reach broader audiences. Based on these models, the class will practice generating interesting research questions and reframing existing debates in original ways. Students will gather, synthesize, integrate, and document research for individual essays and visual presentations. For the final project, students will target a prospective publication venue and compose an essay following this publication's guidelines.

Graduation Composition and Communication Requirement (GCCR)

This course fulfills the written component of the Graduation Composition and Communication Requirement (GCCR) for the Biology major. In order to fully meet the GCCR, students must successfully complete BOTH this course (or another course from an approved list) AND BIO 425, which fulfills the oral communication component of the GCCR. In order to receive GCCR credit a student must:
(a) Earn an average grade of C or better on all GCCR assignments and
(b) Have completed at least 30 credit hours of college-level coursework prior to registering for the course.

Learning Outcomes:

By the end of the semester, students will be able to

- identify a range of audiences and audience expectations based on different science writing genres.
- develop interesting research questions and present existing debates in original, engaging ways.

- analyze science writing texts (written and visual).
- gather, synthesize, integrate and document research for essays and course assignments.
- effectively incorporate visual elements in essays and presentations.
- evaluate specific publication requirements and apply these to their own writing projects.

Required Texts:

Hayden, T., & Nijhuis, M. (Eds). (2013). *The science writers' handbook: Everything you need to know to pitch, publish, and prosper in the digital* age. Boston: Da Capo Lifelong Books.

Additional readings provided as PDFs and links on Canvas.

Optional Text (Highly Recommended for STEM students):
Gilpin, A. A., & Patchet-Golubev, P. (2000). *A guide to writing in the sciences*. Toronto: U of Toronto Press.

Helpful Course Links:

The Crowdsourced Reading List: http://phenomena.nationalgeographic.com/2009/02/01/the-crowd-sourced-reading-list/

Purdue University's Online Writing Lab (OWL) which includes useful information about style, documentation, and grammar. Available at http://owl.english.purdue.edu/

Course Requirements:

Short Writing Assignments: (10%) Five in-class and take-home writing assignments will reflect on the readings and topics discussed in class. Ideas from these writing assignments can and should be included in the essays.

Formal Major Projects: (60%)

1. (10%--1000 words) Rhetorical Analysis of a science writing piece intended for a general audience.
2. (10%--1000 words) An Op-Ed article: This essay will convert a conventional scientific research paper into an informational piece for a broader audience.
3. (10%--1000 words) Brief review of literature essay composed as a basis for the final project.
4. (22.5%) A final project that targets a non-scientific audience and is crafted for a specific science writing publication or venue. This can be a multi-modal project (reflection component—1500 words), traditional article, or essay (3000 words). This project will be presented to the class at the end of the semester.
5. (5%) Final project presentation.

You will revise these projects based on my comments and the comments of your classmates.

Participation: (10%) Class discussion and participation in group work is essential to the growth and exchange of ideas, and thus will affect the overall grade. Discussion questions are included in the participation category.

Peer Review and Workshops: (12%) Peer review is critical to your success as a writer. Peer review grades consist of rough drafts (2% each—rough drafts required for Rhetorical Analysis, Op-Ed, and Review of Literature), and participation in formal written peer reviews (2% each) throughout the semester.

Visual Artifact and Analysis: (7.5%) A Visual Artifact (an Infographic, poster, comic etc.) which clearly and directly conveys a scientific idea or concept. This assignment includes a short analysis of your composition and design choices for the artifact. You will explain your artifact to the class in a brief presentation.

Reflections: (3%) Three informal reflection assignments will help you chart and assess your writing goals throughout the semester.

Exams: No midterm or final exam is required in this course.

Mid-term Grade
Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar (http://www.uky.edu/registrar/calendar).

Major Assignment Due Dates (subject to change):

Assignment	Points	Word Count	Rough Draft	Final Draft
Rhetorical Analysis	100	1000	Jan. 25	Feb. 5
Op-Ed Article	100	1000	Feb. 20	March 3
Review of Literature Essay	100	1000	NA	March 23
Final Project	225	3000	April 10	April 27
Visual Artifact and Presentation	75		NA	March 8
Final Presentation	50		Rehearsals April 19	April 12-26
Short Assignments				
• Short Writings (5@20 points each) • In-Class Group and Individual Participation. (4 @25 points each—announced throughout semester) • Peer Review (6@20 points each 3 rough drafts; 3 responses) • Reflections (3@10 points each)	100 100 120 30	500 (100 each) 600 (200 words per peer response) 450 (150 each)	NA	See Course Schedule
Totals	1000	7550		

POLICIES:
1) Attendance: To help you succeed in this course, attend every class and stay for the entire class period. Note that I will strictly enforce the following Writing Program attendance policies. **For this course, the maximum number of unexcused absences is four.** Students who exceed four unexcused absences will fail the course or have to be withdrawn by a Dean. In the case of an excused absence, it is the student's responsibility to present documentation to the instructor in a timely manner.

Verification of Absences
Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.4.2* states that faculty have the right to request "appropriate verification" when students claim an excused absence because of illness, or death in the family. Appropriate notification of absences due to University-related trips is required prior to the absence when feasible and in no case more than one week after the absence.

Excused Absences
Students need to notify the professor of absences prior to class when possible. *Senate Rules 5.2.4.2* defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later.

Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php.

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused) per University policy.

Per *Senate Rule 5.2.4.2*, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

2) Late Papers Your assignments for this course, including essays, short writing assignments, and class discussion materials are due on the dates indicated on the course schedule at the end of this document or as indicated in class. You may request (in advance) one two-day extension of the due date on the *final draft* of a major assignment (not rough drafts). Late assignments are not accepted unless a two-day extension has been requested and approved in advance of the deadline. If you cannot attend class on the day an assignment is due, you must post the assignment to Canvas by the beginning of class.

3) Submission of Assignments: Each assignment, whether a major project or a homework assignment, will include details about submission of the assignment. Assignments will only be accepted in the designated way and no assignments will ever be accepted via email. You are responsible for ensuring that you are able to submit your work, on time, in the designated manner. For example, if an assignment must be printed and brought to class, you need to ensure that you have access to a printer and can print your assignment before class.

4) Manuscript Requirements: With the exception of in-class writing, all work must be typed and prepared according to APA or MLA manuscript guidelines.

5) Academic Dishonesty:
Per University policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the University may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: http://www.uky.edu/Ombud. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Senate Rules 6.3.1 (see http://www.uky.edu/Faculty/Senate/ for the current set of *Senate Rules*) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about a question of plagiarism involving their work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording, or content from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work (including, but not limited to a published article, a book, a website, computer code, or a paper from a friend) without clear attribution. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work, which a student submits as his/her own, whoever that other person may be. Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone.

When a student's assignment involves research in outside sources or information, the student must carefully acknowledge exactly what, where and how he/she has employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content, and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas, which are so generally and freely circulated as to be a part of the public domain.

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.

6) I do not review essays in the 24 hours before they are due, and I do not discuss grades within 24 hours of returning essays.

7) Courtesy. Turn off cell phones during class time, laptops are not permitted, and reading materials not related to the course are not permitted. Texting is not permitted. Please refrain from eating and drinking.

Only one speaker will have the floor at any given time, and private conversations are unacceptable. Sleeping during class is also unacceptable. Students who text, sleep, or engage in other disruptive activities will be directed to leave for the remainder of the class and counted absent.

8) Grading Procedures: Individual assignments are given numerical grades (0-100), which correspond to a ten point scale: A(90-100), B(80-89), C(70-79), D(60-69), and E (below 60). The final grade will also be calculated on this A-E scale.

9) Writing Center: The Writing Center, adjacent to the HUB on the basement floor of the W.T. Young Library (Room B108B), is available to help you with your writing problems (conceptual and technical) and the composing process. To make an online appointment visit https://uky.mywconline.com/; drop-in visits are also welcome.

10) Email: E-mail provides a seemingly easy way to communicate, but as we will learn, communicating electronically can be complicated. The following guidelines will help ensure that you are communicating clearly, and get the response you desire.

- Give your email a descriptive subject and include "WRD 305" in the subject (i.e., "WRD 305 excused absence for 2/15," not "hi!")
- Use a greeting ("Dear Dr. Carpenter," or "Hi, Professor Carpenter)
- Use standard grammar and punctuation
- Be clear in what you are asking, but not demanding
- Be respectful in your writing
- Sign your email with your first and last name

In return, I will also uphold these guidelines in my electronic communication with you. Emails that provide me with a clear communication of your needs will be responded to promptly, generally within 24 hours. Remember that while email seems instantaneous, I am not always in front of my computer, waiting to reply to your email. Emails asking for information clearly found on the course syllabus or website (i.e., what chapter is being covered in a given week, due dates) will not be answered because this information is available for you.

11) Conferences: If you have concerns about the course, come see me during my office hours or arrange a time for a meeting.

12) Disability Services: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is http://www.uky.edu/StudentAffairs/DisabilityResourceCenter/.

WRD 305 SPRING 2018 COURSE SCHEDULE (SUBJECT TO CHANGES AND EMENDATIONS)

Date	Reading and In-class Activities	Formal Assignments
Week 1 Introductions & Welcome to "Science Writing"		
Jan. 11 (R)	Daily Schedule • Course Introduction • Syllabus, Course Policies, Schedule, Major Assignments • Developing Writing Goals Homework due **Jan. 16**: 1. **Short Writing 1** (2 paragraph response) Locate a piece of science writing written for a broad or non-scientific audience. Summarize the content in one paragraph. Then, in a second paragraph explain where this story appeared, what publication, author, or organization is responsible for it, who is most likely to read it, and why you liked it. Upload to Canvas 9AM. 2. Read • How to Write a Rhetorical Analysis https://www.wikihow.com/Write-a-Rhetorical-Analysis • Texas A&M Writing Center's description of Rhetorical Analysis https://writingcenter.tamu.edu/Students/Writing-Speaking-Guides/Alphabetical-List-of-Guides/Academic-Writing/Analysis/Rhetorical-Analysis	
Week 2 Rhetoric and Science Writing: Fundamentals		
Jan. 16 (T)	Daily Schedule • Review of project 1 • Discuss Rhetorical Analysis Links and Assignment • Discuss Science Writing pieces Homework due **Jan 18**: 1. **Short Writing 2** In 1-2 paragraphs typed, explain what you consider science. What is the difference between "pure" or academic science and the science presented in popular magazines or on shows like Nova? Upload response by 9 AM. 2. Read Ethan Siegel's "Our Universe is Disappearing" @ https://medium.com/starts-with-a-bang/the-disappearing-universe-d7447467c63a 3. Read Carl Zimmer's Blog: Is it Worth Imagining Airborne Ebola? @ http://phenomena.nationalgeographic.com/2015/02/22/is-it-worth-imagining-airborne-ebola/	Upload **Short Writing 1** by 9 AM.
Jan. 18 (R)	Daily Schedule • In-class discussion of Siegel and Zimmer • Conducting a rhetorical analysis in class Homework due **Jan. 23**: 1. Locate a science writing text you would like to analyze for Major Project 1. Be prepared to describe this piece to the class in some detail	Upload **Short Writing 2** by 9AM.

Week 3 Peer Review: Major Project 1		
Jan. 23 (T)	Daily Schedule • Discuss your tentative selection for Major Project 1 • Review some rhetorical analysis samples. Homework due **Jan. 25**: 1. Read *The Science Writers' Handbook* (SWH) chapters 1 and 2. 2. Prepare 2 copies of your Major Project 1 Rough Draft for class (2 printouts)	
Jan. 25 (R)	Daily Schedule • In-class Peer Review of Science Writing Rhetorical Analysis. • Discuss SWH chapters 1 and 2 • Sign up for individual conferences. Homework due **Jan 30:** Before meeting with me, prepare a list of your top three writing/educational goals for this class. Homework due **Feb. 1**: • Prepare Peer Review Letter 1 for a classmate based on Guidelines posted to Canvas. Bring 2 copies to class on Feb. 1 • Read IMRAD link: http://thevisualcommunicationguy.com/writing/how-to-organize-a-paper/how-to-organize-a-paper-the-imrad-format/ • Review *Epidemiology* article "Residential Agricultural Pesticide Exposures and Risks of Spontaneous Preterm Birth"-Available on Canvas (under "Files/Readings")	Two copies of Science Writing Analysis Rough Draft due in class.
Week 4 IMRAD: Structuring an Academic Article		
Jan. 30 (T)	• Individual conferences with me in 1359 POT about Major Project 1 instead of our regular class meeting.	
Feb. 1 (R)	Daily Schedule • Introduction to Major Project 2 • Discuss IMRAD reading • Analyze "Residential Agricultural Pesticide Exposures and Risks of Spontaneous Preterm Birth" Homework due **Feb. 5 (Monday)** Upload Major Project 1 by 9AM Homework due **Feb. 6** Read three short articles by Dr. Krupa (available on Canvas) and prepare at least three questions for his visit.	2 Copies Peer Review Letter 1 due in class.
Week 5 Analyzing Journal Articles		
Feb. 5 (M)	Upload Major Project 1 by 9AM	
Feb. 6 (T)	Daily Schedule • Speaker 1: Dr. James Krupa Visits Homework due **Feb. 8**	

	• Locate a conventional research article that you find interesting and could use for project 2. Bring a copy with you to class. Be prepared to explain this article's main ideas to your classmates in 1-3 minutes. Read *A Guide to Writing in the Sciences* [GWS] Chapter 1 (Canvas Files/Readings) **Short Writing 3** Written response to Dr. Krupa's visit—in two paragraphs, respond to our class speaker. What surprised you about this speaker? What would you ask him/her given the opportunity? Upload to Canvas by 9AM.	
Feb. 8 (R)	Daily Schedule • Explanation of your selected research article. • Preliminary workshop- Major Project 2 • **Reflection 1** written in class. Homework due **Feb. 13**: 1. Read Carl Zimmer's "Note to Aspiring Science Writers" @ http://carlzimmer.com/writers.html 2. Read excerpt from Mary Roach's *Stiff*—PDF available on Canvas.	
Week 6 Peer Review: Major Project 2		
Feb. 13 (T)	Daily Schedule • Discuss Zimmer and Roach Homework due **Feb. 20**: • Bring 2 printouts of Major Essay 2 to class. • Read Review of Literature PDFs posted to Canvas: • Review Major Projects 3 and 4 on Canvas	Upload **Short Writing 3** to Canvas by 9AM.
Feb. 16 (R)	Daily Schedule Class cancelled today.	
Week 7 Writing a Review of Literature		
Feb. 20 (T)	Daily Schedule 1. In-class Peer Review of Informational Essay. 2. Introducing Major Projects 3 and 4 and Visual Presentation Assignment. 3. Analyze Sample Lit Review Essays in class Homework due **Feb. 22**: • Prepare Peer Review Letter 2 for a classmate based on Guidelines posted to Canvas. Bring 2 copies to class on Feb. 22 • Locate a review of literature from an article which covers a topic that you would like to cover in your own review. Be prepared to summarize this in class. How will you use it to jumpstart your Major Project 3? • Read Mann's "Building Bigger Roads Actually Makes Traffic Worse"	Major Essay 2 Rough Draft 2 copies
Feb. 22 (R)	Daily Schedule • Discuss your potential Review and Project 4 Topics • Discuss Mann and analyze Sciopic Blog in class Homework due **Feb. 27**: 1. Read Stanford Visual Rhetoric guidelines: http://web.stanford.edu/~steener/f03/PWR1/whatisvisrhet.htm	Peer Review Letter 2 Two copies.

	2. Find an example of visual rhetoric related to science writing. Be prepared to show your example to the class and explain it in 3-4 minutes. What is the image and what purpose does it serve in the text? How effectively does this visual convey a message?	
Week 8 Visual Rhetoric and Science Writing		
Feb. 27 (T)	Daily Schedule • Discuss Visual Rhetoric • Present Visual Message Responses Homework due **Mar. 1**: • Read Stephen Jay Gould's: "A Biological Homage to Mickey Mouse" @ https://faculty.uca.edu/benw/biol4415/papers/Mickey.pdf Homework due **Mar. 3**: • Upload Op Ed by midnight	
Mar. 1 (R)	Daily Schedule • Mini-Lecture: James Elkins' theories of seeing and looking • Analyze Gould's "Mickey Mouse" Homework due **Mar. 6:** 1. **Due Mar. 6 Bring materials to work on your** Visual Artifact and Presentation. 2. **Due Mar. 8** Present Visual Artifacts and upload Explanatory Paragraphs by 9AM. 3. **Due Mar. 23** upload Review of Literature Essay (Major Project 3) by midnight.	Upload Major Essay 2 by 9AM
Week 9 Visual Artifact Showcase		
Mar. 5 (M)	Midterm Grades Posted	
Mar. 6 (T)	In-class preparation time for Visual Artifact Presentations	
Mar. 8 (R)	Visual Artifact Presentations Homework due **Mar. 20**: 1. Read *SWH* Chapters 5-8 2. Prepare a detailed analysis of your ideal publishing venue following the guidelines listed on Canvas. You will present this in class.	Upload Visual Analysis, Artifact and Explanatory Paragraphs by 9AM.
Week 10 March 13-15 Spring Break!! **Week 11**		
Mar. 20 (T)	Daily Schedule 1. Brainstorm publishing venues and genres for final project 2. Discuss *SWH* Chapters 5-8	
Mar. 22 (R)	In-class Speaker 2 **Homework due Mar. 27** 1. **Short Writing 4** Written response to Speaker 2—in two paragraphs, respond to our class speaker. What surprised you about this speaker? What would you ask him/her given the opportunity? Upload to Canvas by 9AM	

	2. Bring a list of at least five different venues or publications where you could present or publish your final project. This doesn't have to be a realistic list—just places you would really like your work to appear.	
Week 12		
Mar. 27 (T)	Daily Schedule • Discuss SWH Chapters 5-8 • Present publishing venue analysis. • **Reflection 2** written in class. Homework due **Mar. 29**: 1. Find a Science Writing Introduction and Conclusion you really like—bring copies of them to class and be prepared to read them to the group. 2. Bring Writing Materials for your final project to class	Upload Short Writing 4 by 9 AM
Mar. 29 (R)	Daily Schedule • In-class introduction and conclusion workshop • Preliminary writing exercise Homework due **April 3**: Bring in 5 pages of your draft for an initial workshop in class	
Mar. 30 (F)	Upload Major Essay 3 by midnight	
Week 13		
April 3 (T)	Daily Schedule Initial Workshop Major Project 4 Homework due **April 5**: Prepare a brief progress report to present to the class about your research and writing process. This oral report should 1. Explain your topic 2. Ask at least three questions for feedback 3. Discuss at least three sources you are using 4. Provide at least one visual to help the class follow your discussion.	
April 5 (R)	Daily Schedule Progress Reports Homework due **April 10**: 1. Read WS 12-14 2. Two (2) complete copies of Major Project 4 Rough Draft due in class	
Week 14		
April 10 (T)	Daily Schedule In-class Peer Review Homework due **April 12**: Compose Peer Review Letter 3 based on a classmate's draft (see Canvas Guidelines). Bring two copies of this letter to class. Locate one exemplary podcast and one exemplary blog. Be prepared to explain (in class) what five features make each of these stand out.	

	Bring a laptop or internet access with you to class.	
April 12 (R)	Daily Schedule Blogs and Podcasts—discussion and rubrics. Homework due **April 17**: **Short Writing 5:** Find a Ted Talk or other presentation you like. Summarize how it is delivered (what the speaker discusses, how the presentation is organized, what the visuals are like, how the speaker develops a rapport with the audience). What makes this a successful presentation? What techniques can you steal and use in your own presentation? (2 para. Uploaded to Canvas by 9 AM).	Two (2) copies Peer Review Letter 3 due in class.
Week 15 Creating Effective Presentations		
April 17 (T)	Daily Schedule • In class discussion of Ted Talks and presentations. Homework due **April 19**: Review class notes for Jeopardy (for minor prizes)	Upload Short Writing 5 by 9AM.
April 19 (R)	Daily Schedule In-class review of semester terms--Jeopardy	
Week 16 Final Presentations: Showcasing Your Work		
April 24 (T)	Final Presentations	Upload PowerPoint and Presentation Outline by 9AM
April 26 (R)	Final Presentations Conclusions	
April 27 (F)	Final Essay due uploaded to Canvas by midnight	

There is no final exam in this class.

4-Year Plan

4-YEAR CURRICULAR MAP

Bachelor of Science in Biology

UNIVERSITY OF KENTUCKY College of Arts and Sciences

YEAR 1	
FALL	**SPRING**
‡UK Core CC1 (WRD 110) OR Foreign language 201	UK Core CC2 (WRD 111) OR Foreign language 202
UK Core QFO (MA 137:Calculus with Life Science Applications or MA113: Calculus I)	MA 138: Calculus II with Life Science Applications or MA 114: Calculus II
UK Core NPM (CHE 105: General College Chemistry I)	CHE 107: General College Chemistry II
UK Core NPM (CHE 111: General Chemistry I Lab) BIO 148: Introductory Biology I	CHE 113: Lab to Accompany General Chemistry II
BIO 155: Lab for Introductory Biology I or BIO 198: Scholars Biology Research	BIO 152: Principles of Biology II
Total Credits: 16-17	**Total Credits: 15-16**

YEAR 2	
FALL	**SPRING**
BIO 303:Introduction to Evolution OR BIO 304: Principles of Genetics	BIO 303: Introduction to Evolution OR BIO 304: Principles of Genetics
UK CORE SSC	UK Core HUM
CHE 230: Organic Chemistry I	CHE 232: Organic Chemistry II
CHE 231: Organic Chemistry LabI	¤Foreign language 202 OR WRD 111
¤Foreign language 201 OR WRD 110 **Total Credits: 14**	◊ Elective (CHE 233) **Total Credits: 14-16**

YEAR 3	
FALL	**SPRING**
PHY 211: General Physics I	PHY 213: General Physics II
UK Core SIR (STA 296)	Tier 2 BIO Course III (BIO 350 or 430G)
Tier 2 BIO Course I (BIO 315)	*BIO Elective
Tier 2 BIO Course II (BIO 325) **Total Credits: 16**	◊ Elective **Total Credits: 15**

YEAR 4	
FALL	**SPRING**
*BIO Elective	*BIO Elective
*BIO Elective	*BIO Elective
A&S SS	♦BIO 425: Biology Seminar UK Core GDY
UK Core ACR	A&S HUM
UK Core CCC	
Total Credits: 14-15	**Total Credits: 16-17**

‡ Incoming Students are Strongly Encouraged to take WRD 112 to fulfill the CC1 and CC2 requirements if they have any of the following: an ACT English score of 32 or Higher, an SAT Verbal score of 720 or Higher, or an AP English Composition score of 4 or 5. If the Student has been accepted into the University Honors Program, the Student is required to take WRD 112, instead of CC1 and CC2.

* To be discussed with your academic advisor. One of your BIO electives should be used to fulfill the written portion of the GCCR requirement.

♦ Fulfills the oral presentation portion of the GCCR requirement

¤ Students who have taken at least 2 years of a language in high school can complete the A&S Foreign Language Requirement with 3 college semesters of a different language. Students choosing this option should replace the 4th semester of language with electives. Also note that if you take a foreign language placement exam, you may be exempt from 1 or more of the beginning semesters of that language. In this case, replace the by-passed language courses with electives. Any language sequence may be used to satisfy the foreign language requirements - French, German, Greek, or Latin is recommended.

◊ 6 hours of 'free' electives - that do not count toward any other requirement - must be taken. Additional electives may be required to reach the required minimum of 120 hours. Consider pursuing a 2nd major or minor.

UK Core Abbreviations	
HUM =Intellectual Inquiry in the Humanities	CC1= Composition and Communication I
NPM=Intellectual Inquiry in the Natural/Physical/Mathematical Science	CC2= Composition and Communication II
	QFO= Quantitative Foundations
	SIR= Statistical Inferential Reasoning
SSC=Intellectual Inquiry in Social Sciences	CCC= Community, Culture and Citizenship in U.S.
ACR=Intellectual Inquiry in Arts & Creativity	GDY= Global Dynamics

College of Arts & Sciences Abbreviations

SS: Social Sciences NS: Natural Sciences Lab: College Laboratory or Field Experience HUM: Humanities

OSPIE Approval

UNIVERSITY OF
KENTUCKY
Office of Institutional Effectiveness

Substantive Change Checklist[1]

Substantive change, according to the Commission on Colleges of the Southern Association of Colleges and Schools (SACSCOC or SACS), is "a significant modification or expansion of the nature and scope of an accredited institution."[2] Substantive change is a federal concept, based in the regulations of the U.S. Department of Education,[3] which regional accreditors are required to enforce.

The University is required to submit any substantive change to SACS for review, and in some cases approval, prior to implementation of such substantive change. As noted by SACS:

> "if an institution fails to follow the substantive change policy and procedures of the Commission on Colleges, it may lose its Title IV funding or be required by the U.S. Department of Education to reimburse it for money received by the institution for programs related to the unreported substantive change. In addition, the institution's case may be referred to the Commission for the imposition of a sanction or for removal from membership."[4]

Checklist Instructions: To ensure substantive change compliance, individuals should complete the checklist on the following pages in the early stages of any proposal (e.g. new degree program, new certificate program, etc.) or curricular revision. Upon completion, the form must be submitted to the associate provost for institutional effectiveness or designee by e-mail to InstiutionalEffectiveness@uky.edu. A determination as to whether the proposed program or changes to the existing program constitutes a substantive change will be made within seven (7) business days of receipt and next steps will be communicated accordingly.

Questions concerning substantive change are to be directed to Dr. GT Lineberry, associate provost for faculty advancement and institutional effectiveness (gt.lineberry@uky.edu) and Dr. Mia Alexander-Snow, director of planning and institutional effectiveness (mia.alexander-snow@uky.edu).

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[1] Adapted, with appreciation, from University of Virginia's "Substantive Change Checklist."
[2] See *Substantive Change for Accredited Institutions of the Commission on Colleges: Policy Statement*, p. 1.
[3] See 34 C.F.R. § 602.22.
[4] See *Substantive Change for Accredited Institutions of the Commission on Colleges: Policy Statement*, p. 9.

University of Kentucky

Substantive Change Checklist

Instructions: Email completed form to: InstitutionalEffectiveness@uky.edu, Subject line: SACSCOC Sub Change
Questions concerning substantive change are to be directed to Dr. GT Lineberry, associate provost for faculty advancement and institutional effectiveness (gt.lineberry@uky.edu) and Dr. Mia Alexander-Snow, director of planning and institutional effectiveness (mia.alexander-snow@uky.edu).

Name of Proposed Program/Action: Biology GCCR change

Total number of Credit hours for Degree Completion (if applicable): 120

Total number of Credit Hours for Program Major (if applicable):

Sponsoring College: Arts and Sciences

College/Department Contact: Jennifer Osterhage, Biology

Date: December 2, 2018

SACSCOC Substantive Change Items	Yes	No	Don't Know	Provide brief explanation (if necessary)
The proposed program or existing program requires a number of new faculty.		x		
More than 25 percent of the required courses for the proposed or existing program are new.		x		
More than 50 percent of the required courses for the proposed or existing program are new.		x		
The proposed or existing program requires new library or other learning resources.		x		

SACSCOC Substantive Change Items	Yes	No	Don't Know	Provide brief explanation (if necessary)
The proposed or existing program requires new equipment or facilities.		x		
The proposed or existing program requires a new resource base.		x		
The proposed or existing program will initiate a branch campus.		x		
The proposed or existing program will initiate a dual degree program with another institution.		x		
The proposed or existing program will initiate a joint degree program with another institution.		x		
The proposed or existing program will initiate a certificate program? *(if yes, answer the following)*		x		
• Will the proposed certificate program utilize existing courses?				
• Will the proposed certificate program be offered at a new off-Grounds site?				
• Does the proposed certificate program represent a significant departure from previously approved programs?				
The proposed or existing program will be initiated at a new off-Grounds site? *(if yes, answer the following)*		x		
• Will a student be able to earn 50 percent or more of program credits at the site?				
• Will a student be able to earn 25 to 49 percent of program credits at the site?				

SACSCOC Substantive Change Items	Yes	No	Don't Know	Provide brief explanation (if necessary)
• Will a student be able to earn 24 percent or less of program credits at the site?				
The proposed or existing program will be at an existing off-Grounds site? *(if yes, answer the following)*		x		
• Does the proposed program represent a significant departure from previously approved programs [at the existing site]?				
The proposed or existing program will be offered via distance education. *(if yes, answer the following)*		x		
• Will more than 50 percent of the program be offered via distance education?				
• Will 25-49 percent of the program be offered via distance education?				
• Will less than 25 percent of the program be offered via distance education?				
The proposed or existing program or courses will be initiated through contractual agreement or consortium.		x		
The proposed or existing program will relocate an existing off-Grounds site.		x		
The change to the existing program will significantly alter the length of the currently approved program.		x		
The proposed or existing program will initiate a degree completion program.		x		
The proposed program will close an existing program.		**x**		

From: noreply@qualtrics-survey.com
To: Osterhage, Jennifer
Subject: Substantive Change Decision
Date: Friday, December 7, 2018 12:13:45 PM

Dear Jennifer Osterhage,
Thank you for your email regarding the proposed program change(s) to **Biology, Bachelor's (26.0101)**.
My email will serve 2 purposes: 1.) Next steps for SACSCOC, and 2.) Verification and notification that you have contacted OSPIE—a Senate requirement for proposal approval.

1. **Next steps for SACSCOC:** None required
2. **Verification that OSPIE has reviewed the proposal:** Based on the proposal documentation presented and Substantive Change Checklist, the proposed program changes (refer to list below) are not substantive changes as defined by the University or SACSCOC, the university's regional accreditor. Therefore, no additional information is required by the Office of Strategic Planning & Institutional Effectiveness at this time. The proposed program change(s) may move forward in accordance with college and university-level approval processes.

Description of Proposed Change(s):

· We are seeking to change the way that students fulfill the GCCR. Currently, the oral communication portion of the requirement is fulfilled by BIO 425 (Biology seminar), a required course for our major. We are not changing the way that students fulfill that portion of the requirement. The written communication portion of the requirement is currently fulfilled by two courses: BIO 350 (Animal Physiology) and BIO 430G (Plant Physiology). Students also have the option of taking WRD 204 to fulfill the entire GCCR, but very few of our students utilize this option. We would like to drop BIO 350 and WRD 204 as courses that can fulfill the requirement and instead allow students to fulfill the written requirement by choosing one course out of the list below. We propose that students can fulfill the written portion of the GCCR requirement through one of the following courses: 1. BIO 398 (Independent Research): At the October 2018 faculty meeting, we approved a new course that is equivalent to BIO 395 except that it will contain a writing requirement that fulfills the GCCR. The degree audit system cannot distinguish between GCCR and non-GCCR sections of the same course, necessitating the need for a new course. This new course number would also ensure that all students completing independent research would only have to fulfill the GCCR requirement once (the semester they choose to register for BIO 398). 2. BIO 315H (Honors Cell Biology) 3. BIO 404 (Advanced Genetics) 4. BIO 405 (Human Genetics) 5. BIO 418 (Ecological Genetics) 6. BIO 430G (Plant Physiology) 7. BIO 445 (Biology of Sex) 8. WRD 310 (Writing in the Natural Sciences) or WRD 305 (Writing Public Science):Students would receive upper-level Biology elective credit for completion of WRD 310 OR WRD 305. This is a necessity since our major is already a full 120 credit hours. Students will continue to fulfill the oral communication portion of the requirement through BIO 425. Note: Because all of these courses will count towards the major, we are NOT adding any additional credit hours to our degree requirements. Note 2: BIO 425, BIO 430G, and WRD 310 have previously been approved to fulfill either the oral or written components of the GCCR. For courses not yet approved, we have submitted syllabi for evaluation by the GCCR committee. We have also completed the GCCR change form and submitted a new course form for BIO 398 (the only new course being proposed). Related to this change, we would like to add WRD 305 and WRD 310 to our list of acceptable upper-level electives. This will allow students to fulfill the GCCR with courses that count towards the major, so that we do not increase the number of credit hours required of our majors.

Should you have questions or concerns about UK's substantive change policy and its procedures, please do not hesitate contacting our office.

Office of Strategic Planning & Institutional Effectiveness
University of Kentucky
Visit the Institutional Effectiveness Website: https://proxy.qualtrics.com/proxy/?url=http%3A%2F%2Fwww.uky.edu%2Fie&token=w%2BXHkAS0tASxS4xDceQ8e0MxnHdJ2Eu4smnkDcYodCE%3D

Letters

University of Kentucky

College of Arts and Sciences
Education Policy Committee

January 10, 2019

Dear Undergraduate Council,

On behalf of the faculty of the College of Arts and Sciences, the Education Policy Committee discussed and approved the changes to the Biology BA and Biology BS degree program 6:0:3 on Tuesday, January 9, 2019. The proposals are to change the courses that may satisfy the written component of their GCCR.

Sincerely,

Judith G. Prats

Judith Prats
Chair, Education Policy Committee

University of Kentucky

Vincent M. Cassone
Professor and Chair
Department of Biology

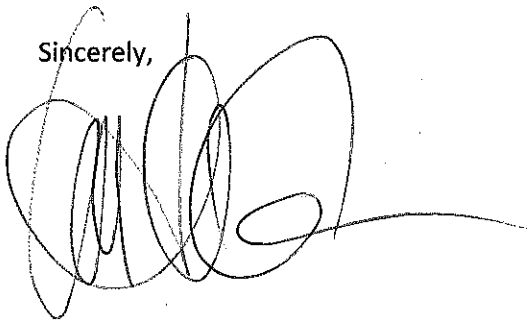
December 3, 2018

Dear Education Policy Committee:

At the November 16, 2018 Biology department faculty meeting, the faculty voted 29-0 to approve a proposal from the Undergraduate Affairs Committee to revise the mechanisms by which Biology majors fulfill the written communication portion of the GCCR. Currently, over 90% of our majors fulfill that portion of the requirement in the Animal Physiology (BIO 350) course. There have been significant challenges to accommodating the GCCR requirement for 200 majors/year in that course. In the proposal that we approved, students could complete the written portion of the GCCR by choosing one of nine possible courses, which significantly increases flexibility for our majors. The proposal does not include a change to the oral communication portion of the requirement, which all Biology majors fulfill using the BIO 425 seminar, a required course for all our majors. We do not anticipate that this change will require additional resources.

Thank you for your consideration of this request.

Sincerely,



Vincent Cassone
Professor and Chair of Biology

101 T.H. Morgan Building | Lexington, KY 40506 | E: vcass2@uky.edu | P: 859-257-2289 | F: 859-257-1717 | https://bio.as.uky.edu

University of Kentucky
College of Arts and Sciences
Department of Writing, Rhetoric & Digital Studies

November 5, 2018

Dear Jennifer:

I am writing to confirm that Writing, Rhetoric, and Digital Studies welcomes Biology students to take WRD 305 and WRD 310 as a GCCR option for their graduation. I understand that approximately 60-70 students will enroll in these courses during an academic year. The department is happy to work with Biology and to provide a rich writing experience for some of its students.

Sincerely,

Jeff Rice
Chair, Writing, Rhetoric and Digital Studies
Martha B. Reynolds Professor in Writing, Rhetoric, and Digital Studies
University of Kentucky