

CHANGE UNDERGRADUATE PROGRAM FORM

1. General Information

College: <u>A&S</u>		Department: <u>Biology</u>	
Current Major Name: <u>Biology</u>		Proposed Major Name: <u>no change</u>	
Current Degree Title: <u>BS in Biology, BA in Biology</u>		Proposed Degree Title: <u>no change</u>	
Formal Option(s): _____		Proposed Formal Option(s): _____	
Specialty Field w/in Formal Option: _____		Proposed Specialty Field w/in Formal Options: _____	
Date of Contact with Associate Provost for Academic Administration ¹ : _____			
Bulletin (yr & pgs):	<u>2014/15 131-133</u>	CIP Code ¹ :	<u>26.0101</u>
		Today's Date:	<u>06/02/15</u>
Accrediting Agency (if applicable):		<u>n/a</u>	
Requested Effective Date:		<input checked="" type="checkbox"/> Semester following approval.	OR <input type="checkbox"/> Specific Date ² : _____
Dept. Contact Person:	<u>Ruth E Beattie</u>	Phone:	<u>257-7647</u>
		Email:	<u>rebeat1@uky.edu</u>

2. General Education Curriculum for this Program:

The new General Education curriculum is comprised of the equivalent of 30 credit hours of course work. There are, however, some courses that exceed 3 credits & this would result in more than 30 credits in some majors.

- There is no foreign language requirement for the new Gen Ed curriculum.
- There is no General Education Electives requirement.

Please list the courses/credit hours currently used to fulfill the University Studies/General Education curriculum:

no change

Please identify below the suggested courses/credit hours to fulfill the General Education curriculum.

General Education Area	Course	Credit Hrs
I. Intellectual Inquiry (one course in each area)		
Arts and Creativity	_____	_____
Humanities	_____	_____
Social Sciences	_____	_____
Natural/Physical/Mathematical	_____	_____
II. Composition and Communication		
Composition and Communication I	CIS or WRD 110	3
Composition and Communication II	CIS or WRD 111	3
III. Quantitative Reasoning (one course in each area)		

¹ Prior to filling out this form, you MUST contact the Associate Provost for Academic Administration (APAA). If you do not know the CIP code, the (APAA) can provide you with that during the contact.

² Program changes are typically made effective for the semester following approval. No program will be made effective until all approvals are received.

CHANGE UNDERGRADUATE PROGRAM FORM

Quantitative Foundations ³		
Statistical Inferential Reasoning		
IV. Citizenship (one course in each area)		
Community, Culture and Citizenship in the USA		
Global Dynamics		
Total General Education Hours		

3. Explain whether the proposed changes to the program (as described in sections 4 to 12) involve courses offered by another department/program. Routing Signature Log must include approval by faculty of additional department(s).

No change

4. Explain how satisfaction of the University Graduation Writing Requirement will be changed.

Current	Proposed
<input type="checkbox"/> Standard University course offering. List: _____	<input type="checkbox"/> Standard University course offering. List: _____
<input checked="" type="checkbox"/> Specific course – list: <u>GCCR - the combination of BIO 425 and BIO 350, or WRD 204</u>	<input type="checkbox"/> Specific course) – list: <u>(a) BIO 425 and BIO 350, or (b) BIO 425 and BIO 430G or (c) WRD 204</u>

5. List any changes to college-level requirements that must be satisfied.

Current	Proposed
<input type="checkbox"/> Standard college requirement. List: _____	<input type="checkbox"/> Standard college requirement. List: <u>no change</u>
<input type="checkbox"/> Specific required course – list: _____	<input type="checkbox"/> Specific course – list: _____

6. List pre-major or pre-professional course requirements that will change, including credit hours.

Current	Proposed
	<u>no change</u>

7. List the major's course requirements that will change, including credit hours.

Current	Proposed
	<u>no change</u>

8. Does the pgm require a minor AND does the proposed change affect the required minor? N/A Yes No
If "Yes," indicate current courses and proposed changes below.

Current	Proposed
	<u>no change</u>

9. Does the proposed change affect any option(s)? N/A Yes No
If "Yes," indicate current courses and proposed changes below, including credit hours, and also specialties and

³ Note that MA 109 is NOT approved as a Quantitative Foundations course. Students in a major requiring calculus will use a calculus course (MA 113, 123, 137 or 138) while students not requiring calculus should take MA 111, PHI 120 or another approved course.

CHANGE UNDERGRADUATE PROGRAM FORM

subspecialties, if any.

Current	Proposed

10. Does the change affect pgm requirements for number of credit hrs outside the major subject in a related field? Yes No
 If so, indicate current courses and proposed changes below.

Current	Proposed

11. Does the change affect pgm requirements for technical or professional support electives? Yes No
 If so, indicate current courses and proposed changes below.

Current	Proposed

12. Does the change affect a minimum number of free credit hours or support electives? Yes No
 If "Yes," indicate current courses and proposed changes below.

Current	Proposed

13. Summary of changes in required credit hours:

	Current	Proposed
a. Credit Hours of Premajor or Preprofessional Courses:		
b. Credit Hours of Major's Requirements:		
c. Credit Hours for Required Minor:		
d. Credit Hours Needed for a Specific Option:		
e. Credit Hours Outside of Major Subject in Related Field:		
f. Credit Hours in Technical or Professional Support Electives:		
g. Minimum Credit Hours of Free/Supportive Electives:		
h. Total Credit Hours Required by Level:	100:	
	200:	
	300:	
	400-500:	
i. Total Credit Hours Required for Graduation:		<i>no change</i>

14. Rationale for Change(s) – if rationale involves accreditation requirements, please include specific references to that.

We are requesting a change in the GCCR requirements for the BS and BA in Biology. GCCR forms are attached. This change provides additional scheduling flexibility for biology majors. It does not result in any changes to the major requirements.

15. List below the typical semester by semester program for the major. If multiple options are available, attach a separate sheet for each option.

CHANGE UNDERGRADUATE PROGRAM FORM

YEAR 1 – FALL: (e.g. "BIO 103; 3 credits")	<u>no change</u>	YEAR 1 – SPRING:	<u>no change</u>
YEAR 2 - FALL :	<u>no change</u>	YEAR 2 – SPRING:	<u>no change</u>
YEAR 3 - FALL:	<u>no change</u>	YEAR 3 - SPRING:	<u>no change</u>
YEAR 4 - FALL:	<u>no change</u>	YEAR 4 - SPRING:	<u>no change</u>

CHANGE UNDERGRADUATE PROGRAM FORM

Signature Routing Log

General Information:



Current Degree Title and Major Name: BS and BA in Biology

Proposal Contact Person Name: Ruth E Beattie Phone: 257-7647 Email: rebeat1@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

Reviewing Group	Date Approved	Contact Person (name/phone/email)	Signature
Biology Faculty	02/20/15	Dr. Vincent Cassone (Chair) / 257-6766 / vincent.cassone@uky.edu	
EPC	10/6/15	Stephen Testa / testa@uky.edu	
Assoc. Dean	10/6/15	Anna Bosch / Anna.bosch@uky.edu	
		/ /	
		/ /	

External-to-College Approvals:

Council	Date Approved	Signature	Approval of Revision ⁴
Undergraduate Council			
Graduate Council			
Health Care Colleges Council			
Senate Council Approval		University Senate Approval	

Comments:

⁴ Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

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

I. General Information:

College:	A&S	Department (Full name):	BIOLOGY
Major Name (full name please):	BIOLOGY	Degree Title:	BS/ BA
Formal Option(s), if any:	_____	Specialty Field w/in Formal Options, if any:	_____
Requested Effective Date: _____			
Semester following approval			
Contact Person:	Ruth E Beattie	Phone:	859-257-7647
		Email:	rebeat1@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 draft 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):

<p>A. List the courses currently used to fulfill the old Graduation Writing Requirement:</p> <p>We are requesting a change to the current GCCR requirements. Currently students satisfy the Graduation Composition and Communication Requirement (GCCR) by completion (with a c average on all GCCR assignments) of either (a) BIO 425 AND BIO 350, or (b) WRD 204. The requirement is being changed to: Students satisfy the Graduation Composition and Communication Requirement (GCCR) by completion (with a c average on all GCCR assignments) of (a) BIO 425 AND BIO 350, OR (b) BIO 425 AND BIO 430G, or (c) WRD 204. Effective date: semester after approval</p>
<p>B. GCCR Program Outcomes and brief description:</p> <p>1. Please specify the Major/Program Student Learning Outcomes (SLOs) pertaining to Composition & Communication and the GCCR requirement. These are <i>program</i> outcomes, not <i>course</i> outcomes. Please specify the program-level SLOs for C&C in your program:</p> <p>Students will be able to present and discuss the concepts, methods, and results of biological research. They will be able to review the biological literature, critically analyze published papers, present written reports in scientific format (Introduction, methods, results, discussion), and present oral reports according to current biological style.</p>
<p>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</p>

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

implementation plan:

Written and oral communication is important to a career in the life sciences, students will develop and enhance these essential skills throughout their undergraduate career. Students will satisfy the Graduation Composition and Communication Requirement (GCCR) by completion (with a c average on all GCCR assignments) of either (a) BIO 425 AND BIO 350 or (b) BIO 425 AND BIO 430G, or (c) WRD 204.

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 425 - Biology Seminar - subtitle required

- 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? Required. This course was previously approved for the GCCR (oral) component. Paperwork has not been resubmitted as there is no change in the course requirements.
- shared or cross-listed course? no
- projected enrollment per semester: 180

Course #2 (if applicable): Dept. prefix, number, and course title: BIO 350 Animal Physiology

- 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? option. This course was previously approved for the GCCR (oral) component. Paperwork has not been resubmitted as there is no change in the course requirements.
- shared or cross-listed course? no
- projected enrollment per semester: 180

Course #3 (if applicable): Dept. prefix, number, and course title: BIO 430G Plant Physiology

- 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? option
- shared or cross-listed course? no
- projected enrollment per semester: 10-15 annually

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:**
WRD
- **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.
- **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: 4/15/2014 - previously approved.

From approving e-mail:

"Dear Ruth,

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

You'll notice that I responded to Mark's email about GCCR matters to say that as WRD Director, I approve your request to use 204 as the GCCR for BIO. I very much want us to proceed to see how we can make this a good arrangement for BIO in the long term, as well
Best,

Adam

Adam J. Banks
Professor and Director
Writing Rhetoric and Digital Studies #UKWRD
Associate Chair, Conference on College Composition and Communication"

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 (see the draft Senate GCCR rule linked [here](#));
- 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.):

Students in the Biology program will take BIO 425 (Senior Seminar - capstone course) and BIO 350 (Animal physiology (Tier II Core course) or BIO 430G Plant Physiology (Tier II Core Course), or WRD 204. Students who opt not to take BIO 350 or BIO 430G (6-8 per year) will take WRD 204 as their GCCR course. The Department of Biology agrees that the WRD 204 course delivers the necessary STEM information literacy for Biology majors

- 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:

BIO 425

2 oral presentations (10 minutes and 20 minutes)

BIO 350

- 3 abstracts

- 3 laboratory reports

- research proposal

- a manuscript describing the research project (suitable for publication in the appropriate peer-review journal).

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

WRD 204

3 written reports totalling 6750 - 8000 words

1 oral or visual report

BIO 430G

Project proposal

6 Written laboratory assignments of varying length for each laboratory exercise conducted.

A manuscript describing the research project (suitable for publication in the appropriate peer-review journal)

BIO 425, BIO 350 and WRD 204 haven been previously approved for GCCR. Only the syllabus for the BIO 430G course is attached.

All of the required assignments are examples of the type of written and oral products that biology majors are expected to master before graduating with a biology degree.

- 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.):

Written component: draft papers/ abstracts will undergo peer review through the use of Calibrated Peer Review @.
Students will revise their draft and submit the final paper by the end of the semester - see page 6 of BIO 430G syllabus.

Oral component: presentations will undergo both peer and instructor review - BIO 425

WRD 204: previously approved for GCCR.

BIO 350 and BIO 425: previously approved for GCCR

- other information helpful for reviewing the proposal:

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):

BIO 350/430G/425: Every three years - per the assessment cycle for the Biology Undergraduate Program

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

Director of Undergraduate Studies, Biology

- 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):

WRD 204 assessment will be carried out by the DUS of WRD on a bi-annual basis with the direct consultation of the DUS in BIO.

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

Signature Routing Log

General Information:

GCCR Proposal Name (course prefix & number, program major & degree):	BIO 425 / BIO 350 or BIO 425/BIO 430G or WRD 204 - BIOLOGY BS/BA
Contact Person Name:	Ruth E Beattie
Phone:	859-257-7647
Email:	rebeat1@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 for expedited review and approval, and then they will be sent directly to the Senate Council Office. Program Changes will then be posted on a web transmittal for final Senate approval in time for inclusion in the Fall 2014 Course Bulletin.
- 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 <i>review by Chair or DUS, etc.</i>	2/20/15	Vincent Cassone, Chair Biology / 257-6766 / vincent.cassone@uky.edu
Providing Program <i>(if different from Home Program)</i>	no change - previously approved by Dr Adam Banks	Adam Banks, Director WRD / / adam.banks3@uky.edu
Cross-listing Program <i>(if applicable)</i>		/ /
College Dean		Anna Bosch, Associate Dean / /
		/ /

Administrative Reviews:

Reviewing Group	Date Approved	Approval of Revision/ Pending Approval ¹
GCCR Advisory Committee		

Comments:

¹ 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.

Ett, Joanie M

From: Yost, Scott A
Sent: Friday, December 11, 2015 3:06 PM
To: Ett, Joanie M
Cc: Badger, Karen; Jensen, Jane M
Subject: GCCR approval of Biology program change
Attachments: Bio Undergrad Program Change.pdf; BIO430G_001_ Plant_Physiologyrevised Dec 2015.docx

Joanie,

The GCCR committee held a meeting on Wednesday, Dec 9, 2015. At this meeting the committee reviewed and approved the program change to Biology relative to adding another track by which biology majors could fulfill the GCCR. It was an unanimous approval. I believe that is the only change in the program form, but I have cc'd Dr. Badger, chair of UC, in case they want to review the proposal and our recommendation.

I did request some clarification from the Biology department, so attached is the original program change application plus a revised syllabus for the proposed new GCCR component class (BIO 430G).

In addition, I will be asking the Biology program to strengthen their agreement with WRD (WRD 204 is another track to fulfill GCCR, but used by only a few students). While the WRD204 track was approved previously, the GCCR committee is unclear how it was approved without a formal MOU/MOA. So we know we cannot unapproved a previous action, but we will stress that a formal MOU/MOA should be executed for the protection of both programs.

Scott (and Jane)
Co-chairs GCCR

Plant Physiology (BIO 430G Fall 2014 – dates will be changed in 2015)

Instructor: Dr. D. Nicholas McLetchie

Office: MDR#3 102A,

Phone: 257 6786:

Email: mclet@uky.edu

Lecture Course material: Blackboard

Text Book web site:

<http://5e.plantphys.net/index.php>

Office Hours: T 3:30 pm – 5:00 pm. or by appointment

Lecture time/location: TR 9:30 am– 10:45 am
MDS 155A.

Laboratory time/location:

R 12:00 pm – 2:50 pm MDS 155A

Teaching Assistant: Rose Marks, 102-B MDR3, rose.marks@uky.edu. Office hours: by appointment

Text: Lecture Plant Physiology 5th Ed Lincoln Taiz & Eduardo Zeiger

Lab Handouts

Pre-Requisites: BIO 148, 152, 155 (or equivalent); CHE 230/231(or equivalent)

Graduation Composition and Communication Requirement (GCCR)

In order to meet the Graduation Composition and Communication Requirement students must successfully complete **BOTH BIO 425 (oral requirement) and BIO 350 or BIO 430G (written requirement)**

This course provides credit for the GCCR written component only. Students will be required to write at least 4,500 words (approx. 15 pages). Written assignments will require students to demonstrate information literacy in the life science field. GCCR assignments will require a drafting/feedback/revision process.

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 description: The physiological processes of green plants and the effect of the environment on these processes.

Main objectives: In general, physiology seeks physical-chemical explanations for how living systems work. Students will become acquainted with plant structure-function relationships at a number of different levels of organization: cell, tissue, organ and organism.

Format: Each week there will be two 75-minute lectures and one 3 hr laboratory (155A -MDS). Lab is worth 25% of your total grade; weekly attendance and participation are required.

Learning outcomes: To gain a detailed understanding of the following plant processes from the molecular, ecological and evolutionary perspective and apply the scientific method to address a specific question:

- 1) Water and solute movement
- 2) Photosynthesis, both light-dependent and light-independent reaction
- 3) Respiration and intermediary metabolism
- 4) Plant responses to both biotic and abiotic influences
- 5) Control of plant growth and development
- 6) Develop testable hypothesis, predictions and rationale for the predictions and experimental designs to test the predictions.
- 7) Conduct a relevant independent research project.
- 8) Understand how to identify the key data needed and how to interpret these data to arrive at a reasonable conclusion with respect to physiological function.
- 9) Write clear and organized laboratory assignments, research proposal, and research paper
- 10) Demonstrate information literacy in the life science field through a research project

Instructor Grading Policy: (See Table Below for Exam Schedule) Grades will be based on an absolute scale:

- A = 90-100%
- B = 80-89%
- C = 70-79%
- D = 60-69%
- E = <60%

I reserve the right to make these cutoffs more lenient. There will be three examinations, two midterms and one final, each worth 25% of your final grade. The final exam will cover the last third of the course, that is, it is not cumulative over the entire course. Each lecture exam will consist of a mixture of thought-provoking short-essay questions and short answer questions (e.g. T/F, fill in the blank, multiple choice). The remaining 25% of your grade will be based on laboratory (*see note below for graduate students and post baccalaureates*). The laboratory syllabus will be handed out in lab. Students making a D and below on the first or second exam are **STRONGLY ADVISED** to have a conference with me within the first week of receiving this grade. **There is no extra credit.**

Note: “Our accreditation association and policy of the Graduate School require that there be different assignments and grading for undergraduate and graduate students in 400G and 500-Level courses.” Therefore, graduate students (including post baccalaureates) will be required to write a critical analysis of an original research paper in the current relevant literature (2009-2013) with a value of 10% of the final grade. That is, for these students, the lecture exams and laboratory will constitute 90% of the grade and the critical analysis will be 10%. **Paper is due on Dec 4th**)

Missed exams: A missed exam will result in a score of zero, unless an acceptable excuse is presented to the instructor within one week of the missed exam. Excused absences as defined by the University including 1) serious illness; 2) illness or death of family member; 3) University-related trips (S.R. 5.2.4.2.C); 4) major religious holidays; 5) other circumstances the instructor find to be “reasonable cause for nonattendance”. If she/he informs the instructor before a missed exam, very often she/he will be given the same exam as the rest of the class. If she/he informs the instructor after a missed exam, she/he will be given a different exam from the rest of the class. Students who miss exams with un-excused absences will incur a 10% penalty for missing the original exam. All missed exams must be made up within one week of the originally scheduled exam date, unless extreme circumstances (e.g. medical or family emergencies) prevent this. Disputes on graded assignments need to be addressed within one week from when the assignment was returned.

Student Code: Students are expected to abide by the UK Student Code (<http://www.uky.edu/StudentAffairs/Code/>); thus, no cheating of any kind will be tolerated. Cheating is a serious academic offense. Persons found to be cheating during the exams will suffer at least the minimum punishment - a zero on assignment for the first offense. An additional penalty may be imposed, such as extra work, reduced letter grade, or a grade of E. A second offense is penalized by a grade of E.

Other: Sep 17th is the last day to withdraw from a class without receiving a ‘W’ grade on your transcript. Nov 7th the last day to officially withdraw from a course. You will receive a ‘W’ on your transcript.

Other readings: To be announced

Detailed Lecture Schedule

This is intended as an outline of the flow of topics in the course. Actual lecture material on a given date may vary. *Note: the information covered on the exams will focus on material presented in the lectures and lectures will sometimes include material covered in other chapters not listed below. I will point this out during the lecture.*

Lecture #	Date		Topic	Reading Assignment
1	Aug	28R	Intro/Plant Cell Biology	Chap. 1,15
2	Sep	2 T	Plant Cell Biology	Chap. 1,15
3		4 R	Mineral Nutrition	Chap. 5
4		9 T	Solute Transport	Chap. 6
5		11 R	Solute Transport	Chap. 6
6		16 T	Solute Transport	Chap. 6
		17 W	<i>Last day to drop without a 'W'</i>	
7		18 R	Water and Plant Cells	Chap. 3
8		23 T	Water and Plant Cells	Chap. 3
9		25 R	Water Balance	Chap. 4
10		30 T	Water Balance	Chap. 4
11	Oct	2 R	Respiration	Chap. 11
		7 T	<i>EXAM lec 1-10 (Chap 1, 3, 4, 5, 6, 15)</i>	
12		9 R	Respiration	Chap. 11
13		14 T	Respiration	Chap. 11
14		16 R	Photosynthesis: Light reactions	Chap. 7
		20 M	<i>Mid Term of Fall Semester</i>	
		21 T	Photosynthesis: Light reactions	Chap. 7
15		23 R	Photosynthesis: Carbon Assimilation	Chap. 8
16		28 T	Photosynthesis: Carbon Assimilation	Chap. 8
17		30 R	Photosynthesis: Ecological Patterns	Chap. 9
18	Nov	4 T	Assimilation of Mineral Nutrients	Chap. 12
		6 R	<i>EXAM lec 10-17 (Chap 7 –11)</i>	
		7 F	<i>Last day to withdraw from a course with a 'W'</i>	
19		11 T	Assimilation of Mineral Nutrients	Chap. 12
20		13 R	Translocation in the Phloem	Chap. 10
		18 T	Translocation in the Phloem	Chap. 10
		20 R	Signal Transduction	Chap. 14
21		25 T	Signal Transduction	Chap. 14
		27 R	<i>Thanksgiving</i>	
22	Dec	2 T	Photomorphogenesis	Chap. 17
23		4 R	Photomorphogenesis (Papers due for Graduates)	Chap. 17
24		9 T	Hormones- Abscisic Acid	Chap 23
25		11 R	Hormones- Abscisic Acid	Chap 23
		17 T	<i>FINAL 10:30 AM in MDS 155A. Lec 18-25 (Chap 10, 12, 14, 17, 23)</i>	

Laboratory

Course content: Plant Physiology lab will consist two types of activities: 1) a planned set of formal labs and 2) an independent project where you will complete an experiment on a plant physiology question of your choice. Ideally the question should cover more than one level of organization. **Written laboratory assignments of varying length for each lab must be completed and submitted through Safe Assign on Blackboard by the deadline for each assignment. After initial review, you will have the opportunity to revise and resubmit your assignments.**

Grading Policy:

Your lab grade will be 25% of your overall grade in the course. There will be a total of 250 points for the entire lab. The specific point breakdown is listed below:

1. independent project: (120)
 - i. proposal: 20
 - ii. presentation: 20
 - iii. manuscript: 80
2. notebook: 10
3. formal labs: (100)
 - i. mineral nutrition: 20
 - ii. transpiration: 20
 - iii. tissue culture: 20
 - iv. gravitropism : 20
 - v. gibberellin: 20
4. class participation and attendance: 20

Notebooks: Each student must maintain a notebook. A lab notebook is a critical component of any research project. Your lab notebook should **not** be a spiral bound book or a binder. For the formal labs as well as a part of your independent project, you will be required to maintain a lab notebook that contains any data/observations collected, the statistical analysis outputs, conclusions, as well as any handwritten notes (such as your calculations for reagents and solutions). The notebook must be clearly written and well organized to receive full credit. You must write in pen, not pensile in your notebook. The notebook will be worth 10 points, and will be collected twice during the semester.

Independent project (see below)

The goal of the independent laboratory is to give students an opportunity to develop a question, design an experiment, use techniques available in the lab, and write a research style manuscript similar to that required for scientific publication on a topic of interest to the student. Students can collaborate on a single project. But the project must be written and submitted independently.

Activities will consist of

- 1) discussions of possible projects (week 2)
- 2) a hypothesis driven proposal (week 4)
- 3) a notebook of the activities
- 4) a manuscript written up as if for a publication

Resources available to you (Mc = McLetchie research Lab)

Personnel

- Your time 42hr 30 min (15 labs * 2hr 50 min)
- Mc's time – there is a limit
- TA's time - there is a limit
- Biology Staff member to assist – make solutions, order etc.

Space

MDS 155A – however it is also used by other teaching labs
Greenhouse space (Mc)
Growth chamber space (Mc)

Supplies

Chemicals
Glassware

Some things can be purchased – please talk with the course instructor about specific purchases, and include them in your proposal.

Equipment

- 1) Opti-Sciences OS5-FL Modulated Chlorophyll Fluorometer - health of photosystem II (Mc)
- 2) Several other simpler units from Opti-Sciences (MDS 155A)
- 3) LI-COR™ 6400 portable photosynthesis System – gas exchange (Mc)
- 4) An imaging system, consisting of a Leica MZ8 dissecting microscope, a Leica compound microscope, and a Macintosh 8500 computer with NIH image 1.57 installed. (Mc)
- 5) Equipment for DNA extraction, quantification (Mc)
- 6) Tecan GENios Plus Plate reader – 96 wells – quantification of some plant pigments. (Mc)
- 7) Data loggers for temperature, humidity, light) (Mc)
- 8) Pressure bomb – measures water potential (Dr. Gleeson)

Laboratory safety

Laboratory attire: OSHA-regulated attire is required for ALL **laboratory exercises**. This includes full-length pants and closed toed shoes. If you are found to be violating these rules, you will be asked to leave the class and your absence from class will be considered an unexcused absence, incurring all the loss of points associated with unexcused absences.

Every student needs to complete the on line safety test and bring to the lab on the Lab. Bring two copies one for MDs 155A and one for the McLetchie Lab. These need to be in lab where you are doing laboratory work. If you have already done this training you can print your certificate from MYUK. It is an easy test and you can take it multiple times until you get a 100 %. The website for the safety test is: http://ehs.uky.edu/classes/classes_ohs_0001.php#chemical_hygiene

When registering for the course, be sure to use the following information:

Department: 8E300, Department of Biology

Building: 0225 TH Morgan

Room: 201

Detailed Laboratory Schedule

Date	Main Topic #	Topic	Assignments due
Aug 28	1	Introduction and tour of facilities	
Sep 4	2	Mineral nutrition Independent project discussion	<ul style="list-style-type: none"> • Safety certificate
Sep 11	3	Transpiration	<ul style="list-style-type: none"> • *Draft Introduction write up for transpiration
Sep 18	4	Photosynthesis Demonstration	<ul style="list-style-type: none"> • *Draft Proposal for independent project
Sep 25	5	Tissue culture	<ul style="list-style-type: none"> • *Revised Introduction for transpiration (20 points)
Oct 3	6	Independent project activities / discussions	<ul style="list-style-type: none"> • *Revised proposal (20 points) • Methods write up for tissue culture experiment (20 points)
Oct 9	7	Gravitropism	<ul style="list-style-type: none"> • Work sheet for mineral nutrition (20 points)
Oct 16	8	Independent project activities / discussions	<ul style="list-style-type: none"> • Results write up for gravitropism (20 points) • Turn in notebook (5 points)
Oct 23	9	Gibberellin	
Oct 30	10	Independent project activities / discussions	<ul style="list-style-type: none"> • *Draft Discussion write up for gibberellin
Nov 6	11	Independent project activities / discussions	
Nov 13	12	Independent project activities / discussions	<ul style="list-style-type: none"> • *Revised Discussion write up for gibberellin (20 points)
Nov 20	13	Independent project activities / discussions	<ul style="list-style-type: none"> • *Draft Manuscript
Nov 27	Thanksgiving		
Dec 4	14	Independent project activities / discussions	
Dec 11	15	Independent project presentations (20 points)	<ul style="list-style-type: none"> • *Revised Manuscript due (80 points) • Notebook due (5 points)

* GCCR assignments 26 – 33 pages total.

Independent Project BIO 430G Fall 2014

The goals of the independent project are to give students an opportunity to develop a question, design an experiment, use techniques available in the lab to conduct the experiment, and write a research style manuscript similar to that required for scientific publication on a **topic of interest to the student**. Students can collaborate on a single project. But the project must be written and submitted independently. Proposals and notebooks can be submitted as a group submission.

The experimental design will follow guidelines provided in the lecture/laboratory by the instructors. The initial draft research proposal is due on September 18, 2014. The revised version is due October 3rd 2014. The draft manuscript on November 20th 2014, and the final manuscript is due no later than December 11th 2014 by 11:59 PM. The writing format described by the Journal of Comparative Biochemistry and Physiology - Part A: Molecular & Integrative Physiology will be used. Go to the journal's web page and look up information for authors at: <http://www.journals.elsevier.com/comparative-biochemistry-and-physiology-part-a-molecular-and-integrative-physiology/>

The "guide to authors" provided by the journal provides the formatting guidelines that must be followed for this assignment. Additional information for this assignment will be made available through lab and posted on the course website.

There are 4 components of the independent project:

- 1) Proposal (due Sep 18th, 20pt)
- 2) Notebook (due Oct 16th, and Dec 11th, 10pt)
- 3) Manuscript (due Dec 11th, 80pt)
- 4) Presentation (due Dec 11th 20pt)

1) **Proposal:** (Due 18th Sep)

The proposal should have 5 distinct sections: 1) Specific Aims and Predictions, 2) Background and Significance, 3) Experimental Design and Methods, 4) Materials and Equipment, 5) Literature Cited. There should be a concise title accurately reflecting the subject of the proposal. The font size should be at least 11 point and margins throughout must be at least 1" on all sides. Number of paragraphs given is a suggestion. I would prefer concise text rather than a very long proposal. You should be able to provide all the required information in a **6 page double-spaced document** (excluding Materials and Equipment, and Literature Cited sections).

Specific Aims (1 to 2 paragraphs)

Give a broad conceptual statement on the research problem you are addressing (why should this be interesting to a non plant physiologist?). List your specific goals are e.g. what is your specific questions or hypotheses you are testing? What is your expected result?

Background and Significance (1 to 3 paragraphs)

Briefly sketch the background leading to the present study. What physiological processes are you investigating? What are you expecting to learn from this research? What is the significance of this process?

Experimental Design and Methods and Materials (3 to 6 paragraphs)

Describe the overall experimental design, procedures, and statistical analyses to be used to accomplish the specific aims of the project. How many and what are your treatments? How many replications? What will be measured? What are the dependent and the independent variables? What type of statistical analysis will be performed (what means will you be comparing)?

Materials and equipment

Provide a list of materials and equipment you will need. Please include a possible source of the material.

Literature Cited

List of citations you used

2) Notebook (due Oct 16th and Dec 11th)

A notebook is a very important component of a research project. The notebook should be understandable so that your work can be repeated by yourself and others. If used properly it will be very useful in writing up your final manuscript.

Enter all data directly into this notebook. Use ink not pencil. Number your pages.

Record sufficient information so that others, including yourself, can follow and understand what you did. Include observations, results, and interpretations in your notebook. You can include printouts of spreadsheets and summaries of relevant research articles etc.

Your notebook should contain 5 laboratory reports (excluding the independent project). Each laboratory report should be 3 – 4 pages long (15-20 pages total).

3) Manuscript (due Dec 11th)

Your manuscript should contain 7 sections (5-7 pages in length)

- 1) **A title page:** title of the paper and your name.
- 2) **Abstract:** The goal of the abstract is to provide a stand alone document that summarizes your study. This includes: a brief statement of the big picture and your specific goals, what you did to address these goals, and your results and interpretations. The abstract should be one paragraph and be between 250 and 500 words.
- 3) **Introduction:** The goal of the introduction is to put your study in context with other studies. The contents of the introduction should move from the big picture to your specific study. It needs to contain your specific goals/questions/hypotheses and expected outcomes. This will be in your last paragraph.
- 4) **Methods:** Goals of the methods are provide sufficient information to allow the reader to know what you did. The method section includes procedures you followed and the types of statistics you performed.
- 5) **Results:** Goal of the results is to provide the basic finding- ‘just the results’. Avoid any interpretations of the data. A graph is generally better than a verbal description of the data.
- 6) **Discussion:** The goal of the discussion is to interpret the data. Did the data support your predictions? If not, then why do you think they did not? What changes would you do to the experiment? What future experiments would you suggest?
- 7) **Literature Cited:** The goal of this section is to list all of the citations used in the manuscript.

Note: Grammar, writing style and formatting are important in how a reader assesses your manuscript.

4) Presentation: (due Dec 11th)

Your research presentation is to be 15 min long (12 of presenting and 3 min for questions and discussions). You need to prepare be this when you start your research. That is, taking pictures of your experimental setup.