
# Agricultural & Medical Biotechnology Self-Study Report

**April 7, 2022**

**Prepared by program faculty and staff and**

**submitted to the Periodic Program Review Committee**

**in advance of the April 24 – 27, 2022 Site-Visit**

## Executive summary

The goal of this self-study document is to provide the review committee with an assessment of both the strengths and areas in need of improvement for the Agricultural & Medical Biotechnology (ABT) program. We are an undergraduate-only interdisciplinary program within the College of Agriculture, Food and Environment (CAFE) at the University of Kentucky. The ABT program benefits from outstanding students, a strong reputation within the University, and a small-but-dedicated core group of faculty and staff. As an interdepartmental program we lack the structured resources available to undergraduate programs housed within academic departments and, as such, we rely heavily on faculty volunteers for instruction, academic advising, and as research mentors. The benefit of this arrangement is that we are able to recruit from a broad collection of faculty in several departments within CAFE, and those faculty who choose to become involved do so out of genuine interest in the success of our students. Department chairs within CAFE have been supportive, as has college administration, but a significant increase in student numbers since our last review has strained our resources.

## Self-study process

The Agricultural & Medical Biotechnology (ABT) undergraduate degree program self-study document was generated by the ABT steering committee chair (Luke Moe, Department of Plant & Soil Sciences) with input from the ABT Director of Undergraduate Studies (Lou Hirsch, Department of Plant Pathology) and the ABT Academic Coordinator (Esther Fleming). Input was also sought from the ABT steering committee. Data used in the report were from ABT records (curated by our academic coordinator) and from Tricia Coakley (Assistant Director of Planning and Assessment, CAFE).

## Administrative Structure of the ABT program

The ABT Steering Committee (ABT SC) is the administrative body for the ABT program, and is led by the SC chair. Other members of the SC include the Director of Undergraduate Studies (DUS), the academic coordinator (AC), an ABT undergraduate student representative (typically the president of the ABT student club), and seven ad hoc faculty who serve for three-year terms. The ad hoc members are nominated by the ABT SC chair and serve at the discretion of the Dean of CAFE. We strive to have a diverse collection of ad hoc members that represent multiple constituent departments within CAFE, as well as members from other colleges across campus that serve our undergraduate population. The SC meets three times during each academic year (Fall, Winter, Spring). When necessary, sub-committees have been established from existing SC members to consider specific programmatic issues. For example, a sub-committee was formed during Spring 2021 to explore options for establishment of new student awards. The SC chair, DUS, and AC also have bi-weekly meetings during the academic year.

## ABT Steering Committee members and affiliations (2021-2022 academic year)

Dr. Luke Moe (Plant & Soil Sciences, CAFE, Chair of the committee)
Dr. Lou Hirsch (Plant Pathology, CAFE, Director of Undergraduate Studies)
Esther Fleming (Academic Coordinator)
Dr. Tomo Kawashima (Plant & Soil Sciences, CAFE)
Dr. Eva Goellner (Toxicology and Cancer Biology, College of Medicine)
Dr. Aardra Kachroo (Plant Pathology, CAFE)
Dr. Bruce Downie (Horticulture, CAFE)
Dr. Vincent Venditto (Pharmaceutical Sciences, College of Pharmacy)
Dr. Olga Tsyusko-Unrine (Plant & Soil Sciences, CAFE)
Dr. Analia Loria (Pharmacology and Nutritional Sciences, College of Medicine)
Hannah Cleary (ABT undergraduate student representative)

## Program history, mission, vision and goals

The ABT program is an interdepartmental, CAFE-affiliated undergraduate program established in 1995. The program operated an individualized degree option under a B.S. in Agriculture between 1989-1994, after which the degree program received formal approval for a B.S. in Agricultural Biotechnology. In the early years of the program, with lower student enrollment, one section of each course was taught and they were dedicated Spring-only or Fall-only courses. With increased enrollment, additional sections were added and most courses are now offered during both Fall and Spring semesters. The program was established largely through the efforts of two faculty members in the department of Plant & Soil Sciences (Professors Joe Chappell and Glenn Collins). Over time, additional faculty self-nominated to become involved in instruction and advising. At present, the bulk of faculty effort in the program has been from the following CAFE departments: Entomology, Horticulture, Plant Pathology, Plant & Soil Sciences, and Veterinary Science.

The primary mission of the ABT program is to train students in modern methods of biotechnology, and to foster an environment that enables them to "think like scientists" by developing and conducting an independent research project. Students are provided with a strong background and technical skills in genetics, molecular biology, and biochemistry, and upon graduation are ready to contribute to a knowledge-based economy. Two key hallmarks of the ABT program are the requirement for an independent research project and the curriculum flexibility offered through specialty support courses. More information on each is included below.

One of the founding principles of the ABT program was the requirement that each student conduct an independent research project under the guidance of a UK faculty member. As described in the *ABT program structure* heading below, the research is conducted in the credit-bearing courses ABT 395 or ABT 399. The difference between these courses concerns whether

the student conducts research “on campus” (i.e., with a UK faculty member) through ABT 395, or “off campus” (i.e., an internship or another university) through ABT 399. These courses are typically taken during a student’s Junior or Senior year. The program structure stipulates that students must take an introduction to biotechnology course, either ABT 101 (Fall, Freshman year) or ABT 310 (Fall, for major change or transfer students), ABT 201 (typically during Sophomore year), and ABT 301 (Typically Spring, Sophomore year or Fall, Junior year) prior to registration in ABT 395/399. ABT 201 exposes students to research across campus by bringing in faculty speakers on a weekly basis to discuss their research programs. Students are required to have a faculty mentor identified prior to enrolling in ABT 301, during which they work with their mentor to develop a research proposal that is ultimately carried out subsequently while enrolled in ABT 395/399. While ABT academic advisors and program leaders put considerable effort into helping students identify research mentors, increased student numbers and a limited pool of faculty willing to engage students in research has been an issue in recent years.

During the semester that a student is enrolled in ABT 395, they are expected to spend time conducting research in their chosen lab during the entirety of the semester (3 research credit hours would be the equivalent of ~8 hours expected in lab per week). Depending on the individual lab, students would be actively mentored by either the faculty mentor, or a graduate student, staff or postdoc in the lab. The PI of the research group is formally the “research advisor”, even if the student is primarily mentored by a student/staff/postdoc in the lab. At the end of the semester, students will write a manuscript outlining their research goals and results, and will participate in the ABT 395/399 research symposium by presenting a 15 minute seminar. While ABT 395/399 is a one-semester commitment for students, many students will also conduct research in the semesters before or after their 395/399 enrollment. The ABT program has different credit-bearing courses allowing for students to get credit for research outside of ABT 395/399. ABT 396 is a variable-credit course that can be taken either before or after ABT 395/399, and does not have the more rigorous paper-plus-presentation requirement at the end of the semester. Students can earn up to six credits in ABT 396, usually across multiple semesters. Students in ABT 396 require a learning contract and are expected to have a professional artifact at the end of the semester, though, and this can be through a poster presentation or a paper.

ABT program leadership is in the process of establishing another credit-bearing laboratory experience course, ABT 394, which should be approved by the UK Senate for the 2022-2023 academic year. This course is meant as a “research laboratory onboarding” course, and will ultimately be a pre- or co-requisite for ABT 301. As intended, this course will not have the expectation of a research project output, but rather will be a 1-credit course during which students will spend time in their chosen faculty mentor’s laboratory learning about the types of research conducted and “easing in” to life in a research laboratory by shadowing researchers and/or learning techniques that may be used during their independent research project. This is meant to ensure that students are, in fact, committed to research with the faculty mentor, and to relieve some of the perceived pressures associated with expectations of generating data sufficient for the ABT 395/399 paper and presentation in one semester. If students are trained in techniques that will be used in their 395/399 research during their ABT 394 semester, they

will feel confident moving forward with their research project. Conversely, in a situation where a lab is obviously not the right fit for a student, they would have the opportunity and time to identify a new faculty mentor prior to conducting their ABT 395/399 research.

In addition to ABT program-required courses (described below), the ABT curriculum incorporates 21 credit hours of specialty support coursework. Specialty support is designed to be flexible to meet student needs, with an extensive list of courses available to fulfill this requirement. These courses can be thought of as "targeted electives", and most are at the 300+ level. Students can opt to take courses that enhance training in a specific area (e.g., microbiology/immunology), to support career goals (e.g., distillation/spirit chemistry), to enhance training for pre-professional students (e.g., anatomy, or courses that enhance training for the MCAT), or to try out separate areas of potential interest for students unsure of their career goals. While program-required courses will not fulfill specialty support, students can take up to 6 credit hours of independent research for specialty support. The list of approved specialty support courses, while too extensive to list here, is available for students to view in their degree audit. Program leadership (AC, DUS, SC Chair) approves new courses as specialty support, and students with specific interests can petition for courses to be approved as specialty support. This has been especially helpful for students pursuing career tracks outside of those conventionally pursued by our graduates (e.g., law or business). See appendix 1 for a standard 4-year plan of coursework.

## ABT program structure (student advising)

The ABT program utilizes a hybrid advising model where the first-year students are advised by the academic coordinator, and sophomores, junior and seniors are advised by faculty. The academic coordinator advises all incoming first-year students with one mandatory, in-person appointment during the first semester and ad hoc appointments as needed. First-year advising is reinforced by the academic coordinator during ABT 101, the first semester introductory course. Incoming first-year students are acclimated to our program with two high impact advising events where the academic coordinator organizes faculty advisors to participate in summer orientations and a fall schedule planning event for the spring semester. For these advising events, the academic coordinator reviews prior credits and typically adds courses to each student's *recommended courses* tab in the enrollment management system. During the first-year student's second semester, each student is typically reassigned to a permanent faculty advisor. Students who transfer into the program are advised by the academic coordinator for one or two semesters and then typically reassigned to a faculty advisor. The academic coordinator may retain students with unique advising needs such as: first generation students, international students, athletes, non-traditional students, probationary students and extended-time-to-graduation students.

Advising for Sophomores through Seniors occurs during the Fall semesters (for Spring enrollment) and Spring semesters (for Fall enrollment, and Summer enrollment if this is of interest to the student), and occurs in meetings between students and their assigned academic

advisors. Individual academic advisors will typically have ~4-8 students under their advisement. Many, but not all, academic advisors also participate in the ABT program as instructors, steering committee members, and/or research advisors. The majority of faculty advisors (24 of 25) are faculty within CAFE.

## ABT program structure (coursework)

The general structure of coursework for ABT students is outlined here. Required courses include UK Core courses, ABT-specific courses, courses taught by other departments, and specialty support courses. It is worth noting here that the majority of ABT students declare their major before matriculating, however we do have a small population of students who transfer to the ABT program from elsewhere within the University or from other institutions.

The UK Core comprises a set of 10 course areas, and all UK students are required to complete one three-credit course from each of the designated Core areas. In some cases, ABT students will complete a specific Core requirement by virtue of program-required courses, while other Core areas must be completed outside of program requirements. More information on the UK Core requirements can be found here: https://www.uky.edu/registrar/content/uk-core.

ABT-specific courses are listed below with a general description of each taken from respective course descriptions. Syllabi for each course from the 2021-2022 academic year are included as appendix 2.

**ABT 101 (Introduction to Biotechnology, 1 credit, lecture only)**
An introduction to biotechnology: historical perspectives, current applications and future directions. The course will consist of informal lectures and interactive discussions led by Biotechnology faculty and visiting professionals. The course will also orient students to the educational/career opportunities in Biotechnology and assist them in developing a focus for their individualized degree programs. Lecture, two hours per week.
Pre-req: First year or first semester transfer students in Agricultural & Medical Biotechnology
*Note: This is taken during the first semester for incoming ABT Freshman and is a key element in cohort-building for ABT students. This is only offered during the Fall semester. Transfer students are not required to take this course, but will take ABT 310 as an equivalent (which is still under development with a target date of Fall 2022).*

**ABT 120 (Genes and Society, 3 credits, lecture plus lab)**
This course is designed for science and non-science majors, giving students an understanding of how genetics influences and impacts our social fabric on a daily basis, and equipping students with a sufficient understanding to participate in the policy debates that are impacting our lives. The course will introduce students to the basic concepts of genetics and to the modern methodologies of molecular genetics. The course will also educate students in the process of scientific discovery and empower students with the knowledge and critical thinking skills necessary to evaluate the present and future impact of genetics on society. While the course is

intended for freshmen, students at all class standings are welcome to enroll. (Offered in spring only.) Pre-req: none
*Note: In addition to being an ABT-program required course, this course fulfills the Natural, Physical, Mathematical Sciences UK Core area. Transfer students are not required to take this course.*

**ABT 201 (Scientific Method in Biotechnology, 1 credit, lecture only)**
A course designed to acquaint students with the common experimental methods used in agricultural biotechnology. Students will be presented with several case studies which demonstrate basic scientific reasoning and experimental strategies. The students will then use their understanding of basic scientific methods and agricultural systems to critically evaluate work from the current scientific literature. Each student will be required to provide a written and oral evaluation of a research project in some aspect of agricultural biotechnology. The class will provide the students with the basic skills needed for preparing their own research proposals. Pre-req: ABT 101 and enrollment in the Agricultural Biotechnology degree program or consent of instructor.
*Note: This comprises one of our two required courses that contribute to the program Graduation Composition and Communication Requirement (GCCR), which is a requirement for all undergraduate majors at UK. This course is offered both Fall and Spring semesters.*

**ABT 301 (Writing & Presentation in the Life Sciences, 2 credits, lecture only)**
This course will focus on effective communication of ideas and research results in biotechnology. It will focus on both written presentations, in the form of research publications and research proposals, and oral presentations. The focus of this course is on student participation. Students will be required to provide both oral and written evaluations of research publications and proposals. The first part of the semester will focus on a dissection, evaluation, and discussion of recent Biotechnology-related research publications. Students will be required to provide both oral and written evaluations of the publications that are discussed. Next, they will discuss the aspects of successful oral presentations, including the effective use of visual aids. The middle of the semester will be spent developing a research proposal, focusing on the separate components of a proposal. The end of the semester will involve student presentations of a research proposal that they have developed. These presentations will be evaluated and discussed by the other members of the class. The goal of this course is to develop skills in the evaluation of research, to provide practice in scientific writing, to prepare Biotechnology students to write their independent study research proposals and written reports, to develop oral communication skills, and to expose students to current literature and research in Biotechnology. Lecture, discussion and oral presentations. Pre-req: Agricultural Biotechnology major or consent of instructor.
*Note: This comprises one of our two required courses that contribute to the program Graduation Composition and Communication Requirement (GCCR), which is a requirement for all undergraduate majors at UK. Students are required to have identified a research mentor for this course. While they are not required to conduct laboratory research as part of this course, this serves as a pre-req for independent research in ABT 395/399. Three sections are offered in both the Fall and Spring semesters.*

**ABT 360 (Genetics, 3 credits, lecture only)**
The basic principles of heredity as currently understood from evidence accumulated in classical, cytogenetic, molecular, and quantitative genetic experiments. Emphasis is placed on a thorough understanding of genetic principles and the relationship of genetics to all biological disciplines. Pre-req: Six credits in biological sciences and one course in general chemistry.
*Note: This course is offered in both the Fall and Spring semesters.*

**ABT 395/399 (Independent Study in Biotechnology/Research Experience in Biotechnology, 3 credits, laboratory research)**
395: Independent study (research project) in biotechnology under the supervision of a faculty member. Pre-req: ABT major and consent of appropriate instructor before registration.
399: An internship in biotechnology under the supervision of a faculty member. May be repeated to a maximum of six credits. Pre-req: Consent of the instructor and completion of a learning contract before registration.
*Note: ABT 395 and 399 differ only in the research conducted. ABT 395 is taken when a student conducts research under the mentorship of a UK faculty member, and ABT 399 is taken when a student conducts research off campus (e.g. an internship at a company). This course is offered in Fall, Spring, and Summer semesters. As part of a curriculum revision, the variable-credit nature of the courses will be changed to three credits to standardize the student experience for this important major requirement.*

**ABT 396 (Research Experience in Biotechnology, 1-4 credits, laboratory research)**
Research in biotechnology under the supervision of a faculty member. One to four credit hours/semester. The course may be repeated for a maximum of six credits, but the student must meet the requirements each semester to allow enrollment. This course should further the students' experience with science, enhance their appreciation for the scientific process, and what it means to conduct scientific research. Pre-req: Agricultural and Medical Biotechnology major, consent of advisor before registration and identification of a faculty research mentor.
*Note: This is an independent research course that can be taken before or after ABT 395/399. The course requirements differ, and this is designed for flexibility and to enable students to gain additional credits for conducting independent research. This is not a required course. This course is offered in Fall, Spring, and Summer semesters.*

**ABT 460 (Introduction to Molecular Genetics, 3 credits, lecture only)**
ABT 460 is designed to provide students with an introduction to the molecular mechanisms underlying DNA replication, gene expression and genome maintenance in prokaryotic and eukaryotic systems. With an understanding of the basic features of molecular genetics, we will apply this knowledge to issues of development, evolution and disease. Pre-req: ABT 360 (or equivalent) or consent of instructor.
*Note: This course is offered in both Fall and Spring semesters.*

**ABT 461G (Introduction to Population Genetics, 3 credits, lecture only)**

This survey course examines the population dynamics and equilibria of genes in nuclei, chloroplasts and mitochondria. Emphasis will be on biological relevance (in plants, animals, and micro-organisms), but some theoretical derivations will also be introduced. Pre-req: ABT 360 (or equivalent) and one course in probability/statistics.
*Note: the "G" indicates that this can be taken for graduate credit if so desired. This was added at the request of a separate graduate program looking for relevant coursework. Requirements differ for those taking the course for graduate credit as opposed to undergraduate credit. This course is offered in both Fall and Spring semesters.*

**ABT 480 (Special Topics in Agricultural and Medical Biotechnology, 1-6 credits)**
This course focuses on unique and timely topics in Agricultural and Medical Biotechnology. May be repeated under different subtitles for a total of six credits. Prereq: Consent of instructors.
*Note: this is a course structured such that faculty can develop unique experiential courses or "test run" courses. Different sections will be available for different courses. This is a relatively new heading and only two sections have been offered to date, including a 1 credit course during Fall 2021 on "Confocal Laser Scanning Microscopy Principles for Plant Biology" taught by Prof. Tomo Kawashima. This is not a required course.*

**ABT 495 (Experimental Methods in Biotechnology, 4 credits, lecture plus lab)**
A laboratory techniques course designed to give students the technical skills and understanding necessary to critically examine biological systems at the molecular level. The course will emphasize the principles of chemistry, biochemistry and molecular biology as applied to a model system for laboratory investigations. Laboratory, eight hours per week. Pre-req: ABT 360 (or equivalent), Agricultural Biotechnology major or consent of instructor.
*Note: Two sections are offered in the Fall semester (capped at 21 students per section), one section is offered in the Spring semester.*

Also note that we have a major program change proposal that is currently being considered by the Undergraduate Curriculum Committee. The changes are outlined in appendix 3. Two additional courses are proposed in this document, ABT 310 and ABT 394. A basic description of each is described below.

- ABT 310: Introduction to Biotechnology for New Majors and Transfer Students (1 credit)
    - Equivalent to ABT 101, but taken by students transferring into the major
    - Increased rigor compared to ABT 101, focuses on ABT advising, with posters, writing, joining labs, measuring, lab prep to prepare for the research experience.
    - Pre-req: Sophomore status and major standing in ABT
- ABT 394: Introduction to Laboratory Research (1 credit)
    - Make a required class, as a pre-req or co-req with ABT 301 (also with consent of instructor to allow for flexibility).
    - A 1 credit research-onboarding course for students to get into their respective labs to learn techniques and familiarize themselves with laboratory research.
    - This differs from ABT 396 in that ABT 394 does not have the expectation of a scholarly output at the end of the semester.

Addition of these courses to the curriculum will not change the overall total credit hours required for graduation. The 1-credit addition of ABT 394 will be balanced by removing the requirement for BIO 155 (1 credit) in the upcoming major program change.

## Program requirements

Credits required for graduation (125 credits)
UK Core credits (30 credits, note that 9 of these credits are fulfilled through ABT curriculum-required courses)
Pre-major required courses

- BIO 148 (Introductory Biology I, 3 cr)
- BIO 152 (Principles of Biology II, 3 cr)
- BIO 155 (Lab for Introductory Biology, 1 cr)
- CHE 105 (General College Chemistry I, 3 cr)
- CHE 107 (General College Chemistry II, 3 cr)
- CHE 111 (Gen Chem I lab, 1 cr)
- CHE 113 (Gen Chem II lab, 2 cr)
- CHE 230 (Organic Chemistry I, 3 cr)
- CHE 231 (Organic lab I, 1 cr)
- CHE 232 (Organic Chemistry II, 3 cr)
- CHE 233 (Organic lab II, 1 cr)
- MA 123 (Elementary Calculus and its Applications, 4 cr) or MA 113 or MA 137
- PHY 211 (General Physics I, 5 cr)
- PHY 213 (General Physics II, 5 cr)

Major required courses (34 credits)

- ABT 101 (1 cr)
- ABT 120 (3 cr)
- ABT 201 (1 cr)
- ABT 301 (2 cr)
- ABT 360 (3 cr) or BIO 304 (4 cr)
- ABT 395/399 (3 cr)
- ABT 460 (3 cr)
- ABT 461 (3 cr)
- ABT 495 (4 cr) or BIO 510 (4 cr)
- BIO 308 or 208 (Microbiology, 3 cr)
- BIO 309 or 209 (Microbiology Laboratory, 2 cr)
- STA 296 (Statistical Methods and Motivations, 3 cr) or BST 230 (Statistical Thinking in Public Health, 3 cr)
- BCH 401G (Fundamentals of Biochemistry, 3 cr)

Credits required at 300+ level (45 credits)
Specialty support (21 credits)

- Specialty support courses are a portion of the ABT coursework that allows students to broaden their scientific knowledge outside the major requirements either to strengthen knowledge in biotechnology or to complement this knowledge to support training for various career paths. Some students find it helpful to think of specialty support classes as targeted electives. For more information see the ABT specialty support website: https://abt.ca.uky.edu/specialty.

Elective courses (7-10 credits)

## Program-level student learning outcomes (PSLOs)

Undergraduate programs at UK use PSLOs as an assessment strategy to determine how effective they are at meeting educational objectives that are established by the programs themselves. The objectives and assessment strategies are generated by program leadership, after which the programs collect data on a yearly basis. PSLO assessment operates on a 4-year cycle, and we are in year 2 of the current cycle. Years 1 and 2 focus largely on data collection, while years 3 and 4 of the cycle focus on interpretation of the data and implementation of changes. Reporting is done annually, and is coordinated by the UK Office of Strategic Planning and Institutional Effectiveness. The ABT PSLOs and assessment strategies for the current cycle are listed below.

*PSLOs*

1. Acquire knowledge about the range of approaches to manipulate and improve plants, animals and microorganisms
2. Demonstrate the ability to develop, interpret and critically evaluate modern approaches to scientific evaluation
3. Evaluate how their experience in the program has influenced their outlook on the relationship between society and biotechnology, and how their personal philosophies and values have been influenced as a consequence of the program
4. Participate in research projects including the requirements of the independent study course ABT 395 or experiential learning course ABT 399 and demonstrate oral and written science communication

*Assessment strategies*

The assessment strategies used to measure PSLOs comprise evaluation of final papers from ABT 201 and presentations from ABT 395. This is meant to capture data on student competence with regards to the four PSLOs in the early stages of their progress through the ABT program (ABT 201) and in the later stages (ABT 395). Course instructors and members of the ABT steering committee evaluate the papers/presentations based on a standard scoring rubric. Assessment data (shown in full appendix 4) indicate that benchmarks are being met based on our most recent review. Because we are early in the 4-year cycle, no curriculum changes have been suggested based on available data.

## ABT-affiliated faculty and staff

Current academic advisors (as of Fall 2021) are listed below with their department and college affiliations. All ABT instructors are also academic advisors, and whether an individual is an instructor is listed in the chart.

| Name | Department | College | Instructor? |
|---|---|---|---|
| Ernie Bailey | Veterinary Science | CAFE | |
| Bruce Downie | Horticulture | CAFE | YES |
| Mark Farman | Plant Pathology | CAFE | |
| Chuck Fox | Entomology | CAFE | YES |
| Dan Howe | Veterinary Science | CAFE | YES |
| Aardra Kachroo | Plant Pathology | CAFE | YES |
| Luke Moe | Plant & Soil Sciences | CAFE | YES |
| Reddy Palli | Entomology | CAFE | |
| Sharyn Perry | Plant & Soil Sciences | CAFE | YES |
| Lisa Vaillancourt | Plant Pathology | CAFE | |
| Craig Vander Kooi | Biochemistry | College of Medicine | YES |
| Xugou (Joe) Zhou | Entomology | CAFE | YES |
| Esther Fleming | ABT (academic coordinator) | CAFE | |
| Nick Teets | Entomology | CAFE | YES |
| Clare Rittschoff | Entomology | CAFE | |
| Tomo Kawashima | Plant & Soil Sciences | CAFE | YES |
| Lou Hirsch | Plant Pathology | CAFE | YES |
| Art Hunt | Plant & Soil Sciences | CAFE | YES |
| Carrie Shaffer | Veterinary Science | CAFE | |
| Olga Tsyusko | Plant & Soil Sciences | CAFE | YES |
| Tonja Fisher | Entomology | CAFE | YES |
| Carlos Rodriguez Lopez | Horticulture | CAFE | YES |
| Kendall Corbin | Horticulture | CAFE | YES |
| Julian Dupuis | Entomology | CAFE | YES |
| Rick Bennett | Plant Pathology | CAFE | YES |

**NUMBERS SUMMARY BY DEPARTMENT (25 advisors, 16 instructors**):
Biochemistry (College of Medicine): 1 advisor, 1 instructor
Entomology (CAFE): 7 advisors; 5 instructors
Horticulture (CAFE): 3 advisors; 2 instructors
Plant Pathology (CAFE): 5 advisors; 3 instructors
Plant & Soil Sciences (CAFE): 5 advisors; 5 instructors
Veterinary Science (CAFE): 3 advisors; 1 instructor

The data above provides a historically accurate representation of faculty effort by department, with the majority of faculty effort contributed by the departments of Entomology, Horticulture, Plant Pathology, Plant & Soil Sciences, and Veterinary Science. It is worth noting that the departments differ considerably in their overall faculty number, and each department has faculty that contribute to both general (UK Core) courses as well as faculty that contribute effort to other undergraduate (and graduate) programs within CAFE. A collection of information concerning awards received by ABT faculty and staff is found in appendix 5.

The chart below shows a breakdown of faculty effort by department. This includes the total number of faculty per department as well as the number that are affiliated with ABT, either as an advisor, instructor, or both. The full-time equivalent (FTE) devoted to instruction for the ABT-affiliated faculty, and total ABT credit hours taught by these faculty are also shown. With the exception of Plant Pathology, each of these departments contributes teaching effort to other undergraduate programs, some of which are housed within their respective departments. For example, the Plant & Soil Sciences department also contributes faculty effort to instruction in Sustainable Agriculture & Community Food Systems (SAG, an inter-departmental program), in Natural Resources & Environmental Sciences (NRES, an inter-departmental program), and Agricultural Ecosystem Sciences (AES). The AES program is relatively new (~3 years) and currently offered as an "individualized program in agriculture", and the department is hoping to increase enrollment such that this will be approved for baccalaureate status. As such, significant departmental resources are devoted to this new program.

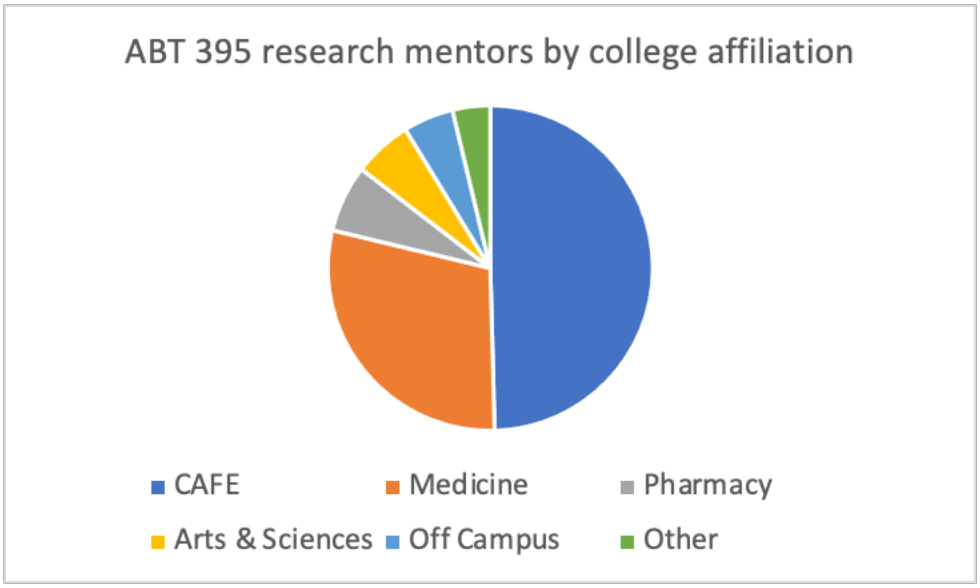
| Department | Total faculty | Faculty affiliated with ABT | FTE instruction for ABT-affiliated faculty | Total ABT credit hours taught 2015-2021 | Other undergraduate program affiliations |
|---|---|---|---|---|---|
| Entomology | 19 | 7 | 2.00 | 1715 | ENT$^{\dagger}$ |
| Horticulture | 12 | 3 | 0.42 | 178 | HRT*, SAG |
| Plant Pathology | 12 | 5 | 1.43 | 1859 | |
| Plant & Soil Sciences | 39 | 5 | 1.62 | 1595 | AES*$^{\dagger}$, SAG, NRES |
| Veterinary Science | 17 | 3 | 0.40 | 255 | ESM |

Abbreviations: AES (Agricultural Ecosystem Sciences); ENT (Entomology); ESM (Equine Science & Management); HRT (Horticultural Sciences); NRES (Natural Resources & Environmental Sciences); SAG (Sustainable Agriculture & Community Food Systems)
* indicates that this program is housed within the department, all other programs are interdepartmental
$^{\dagger}$ indicates that this program is currently offered as an individualized program in Agriculture. This designation is in place for smaller programs and those yet to be approved by the faculty senate as baccalaureate programs.

## Research and Extension engagement of faculty advisors

As described above, ABT students conduct research in the laboratories of UK faculty in two credit-bearing courses, ABT 395 and ABT 396. Students are required to take ABT 395, while ABT 396 is not required but taken by students who opt to conduct research-for-credit over the course of multiple semesters. We collected data on ABT 395 research advisors between 2016-2021. This allowed us to generate a comparison of the mentoring load between colleges, and also allowed us to collect statistics on the individual faculty mentors to assess their scholarly output.

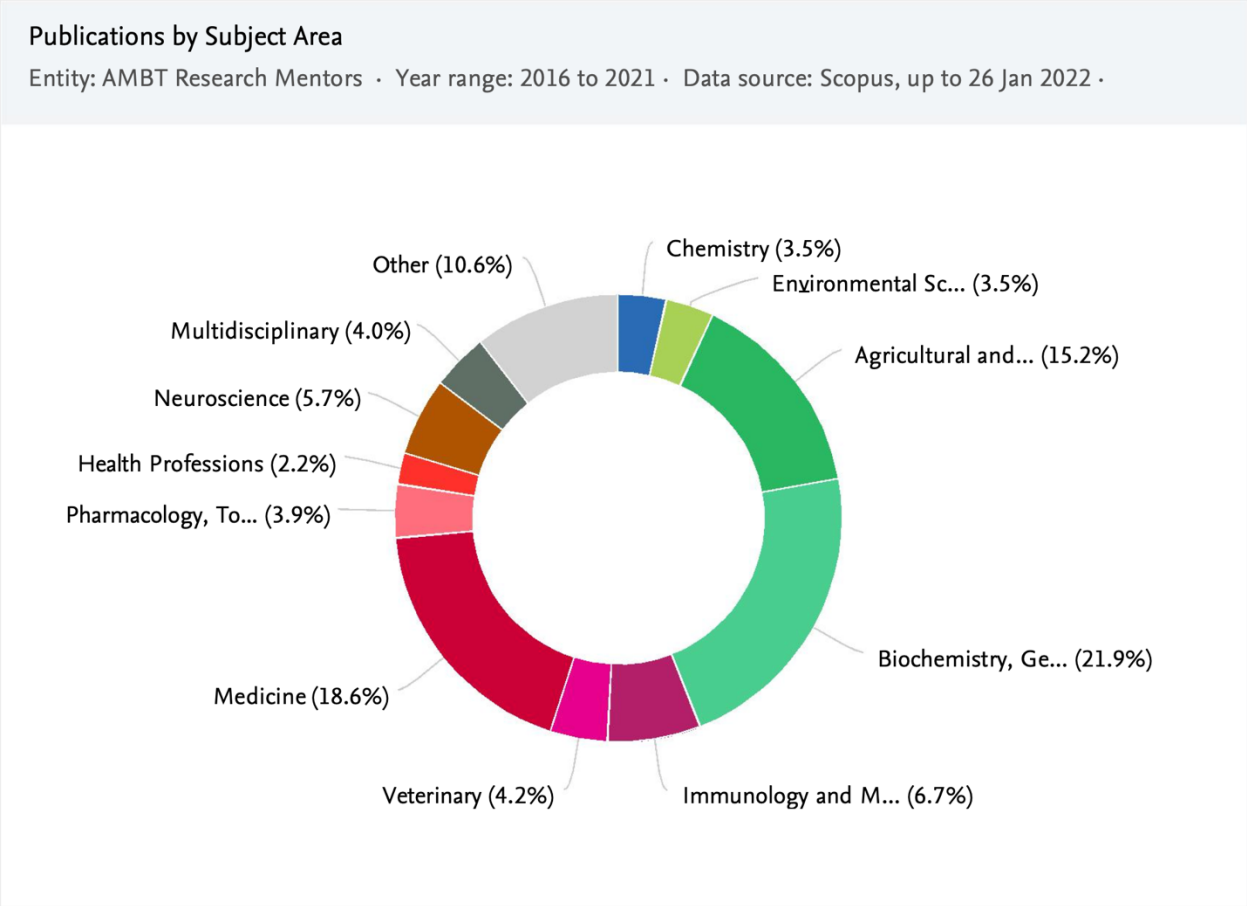
Between 2016-2021, 239 students completed ABT 395. The names and departmental affiliations of each faculty mentor are included as appendix 6 and a listing of associated student publications is found in appendix 7. The pie chart below shows the breakdown of mentoring according to college affiliation, with the majority from CAFE (49.6%) and the College of Medicine (29.2%). This data is sorted by the total number of students, not by unique mentors. So a faculty member that mentored 5 students, for example, would count as 5/239 here. A total of 127 different faculty advisors were counted for the 239 students, with 74 one-time research mentors and 53 who mentored more than one student during this time period.




We used SciVal to assess the research performance of faculty who serve as research mentors for ABT students between 2016-2021. SciVal is a web-based tool used to analyze research productivity of individuals and institutions, and can be used as a comparative tool when looking to measure the impact of faculty researchers. Our goal in doing this was to determine whether our students are performing research in productive laboratories, and in doing so, potentially link lab productivity with student effort.

In short, ABT research mentors are highly productive and publish impactful research. Among the listed research mentors, 2,126 articles (average of 16.7 per faculty) were published with a 31,715 citation count, for an average of 14.9 citations per publication. The field-weighted citation impact (FWCI) was 1.45. FWCI, in a general sense, is a measure of the citations received divided by what would be expected based on the average number in the given field. In this sense, the FWCI of 1.45 indicates a 45% higher citation rate than would be expected for "average" within the field.

The publications by subject area are listed below, which show the highest number of publications in "biochemistry", "agriculture", and "medicine", which correlates reasonably well with the breakdown of faculty mentors by college.




The top 5 research clusters over this time frame are shown below. Notably, the FWCI in each discipline is higher than one for each.

Top 5 Research Topic Clusters

Entity: AMBT Research Mentors · Year range: 2016 to 2021 · Data source: Scopus, up to 26 Jan 2022 ·

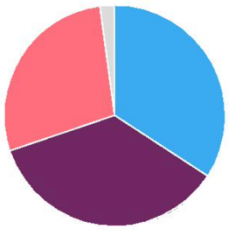
| | By this Group of Researchers | | Worldwide |
|---|---|---|---|
| Topic Cluster | Scholarly Output | Field-Weighted Citation Impact | Prominence percentile |
| Arabidopsis; Plants; Genes<br>TC.11 | 82 | 1.52 | 98.528 |
| Alzheimer Disease; Dementia; Amyloid<br>TC.32 | 77 | 2.45 | 98.395 |
| Echinococcosis; Schistosomiasis; Parasites<br>TC.109 | 72 | 1.38 | 77.191 |
| MicroRNAs; Long Untranslated RNA; Neoplasms<br>TC.219 | 62 | 1.88 | 99.599 |
| Ankle; Foot; Diabetic Foot<br>TC.319 | 50 | 1.28 | 69.632 |

Data below show the scholarly output according to the collaborative nature of faculty research. This demonstrates that ABT faculty mentors are highly collaborative, with an especially high rate of international collaboration.

Collaboration

Entity: AMBT Research Mentors · Year range: 2016 to 2021 · Data source: Scopus, up to 26 Jan 2022 ·

Scholarly Output in AMBT Research Mentors, by amount of international, national and institutional collaboration



| Metric | | Scholarly Output | Citations | Citations per Publication | Field-Weighted Citation Impact |
|---|---|---|---|---|---|
| International collaboration | 34.2% | 726 | 15,268 | 21.0 | 1.88 |
| Only national collaboration | 35.7% | 759 | 9,800 | 12.9 | 1.32 |
| Only institutional collaboration | 28.0% | 596 | 6,474 | 10.9 | 1.11 |
| Single authorship (no collaboration) | 2.1% | 45 | 173 | 3.8 | 1.13 |

In contrast to research engagement, extension engagement among ABT-affiliated faculty is limited. While approximately 50% of students are mentored by CAFE faculty, most of these faculty members do not have an extension appointment. With the exception of Veterinary Science, all of our CAFE affiliate departments have faculty with extension appointments. Data from the most recent departmental statistical reports (2020) show the following percentage of faculty from each department have an extension appointment: Entomology (17%), Horticulture (25%), Plant Pathology (36%), Plant & Soil Sciences (24%). Veterinary Science has "clinical" appointments (8%) rather than extension. While most extension faculty do retain a percent research effort, our students (with exceptions) typically do not engage in research with these faculty, as these faculty are typically more engaged with applied agriculture undergraduate programs such as SAG and AES. One notable exception would be Nicole Gauthier (extension Plant Pathology) who mentored three ABT 395 students during the 2016-2021 timeframe. Some students have had the opportunity to present during UK CAFE "field days", which are on-farm events that attract producers from the region as a means to demonstrate ongoing applied research related to commodity crops in Kentucky. For example, Adrienne Arnold (2018 ABT graduate) presented a poster during the 2017 UK Hemp field day during which she described her work related to the microbial ecology of retting in fiber hemp.

## Progress since prior review

The previous review was conducted in 2013, during which Dan Howe (Department of Veterinary Science) was the chair of the ABT steering committee. The current chair (Moe) was on the steering committee at that time, but the committee has otherwise completely changed since then, including a new Director of Undergraduate Studies (Hirsch). Below we outline the recommendations from the previous review (underlined) as well as steps taken to implement those recommendations.

1. The review committee recommended that the College of Agriculture, Food and Environment (CAFE) prioritize promotion and sustainability of the ABT program, especially in light of a new budget model that was seen to promote competition between undergraduate programs at the University. ABT program leadership was able to utilize resources within CAFE to better advertise ABT among current and prospective students. This, along with other factors (outlined below), has resulted in a significant increase in the average incoming freshman class size.
2. The review committee recommended additional CAFE resources be committed to ABT in the form of a full-time academic coordinator and two full-time TAs. The Dean's office committed to a full-time academic coordinator (AC) and has funded one half TA line (i.e., one TA for one semester). Esther Fleming, who was at 50% effort for her AC work at the time was brought on at 100% effort (beginning Fall 2014). The ABT budget was increased to account for the TA for one of our laboratory-intensive courses (ABT 120). As outlined below, we continue to have difficulty finding TAs for those courses that require a TA. As an interdepartmental undergraduate program (i.e., *not* a department), we do not have a graduate program from which we can pull TAs, nor can we compel graduate students from our participating departments to serve as TAs. As in other matters, we have relied on the goodwill and resources of department chairs from our participating departments when seeking out both instructors and TAs.
3. The review committee encouraged a program name change to better align the program's title with our mission, student interests, and to enhance the program's reach. At the time of the previous review (2013), we were the "Agricultural Biotechnology" undergraduate program. Following the recommendation, and with input from relevant stakeholders, the decision was made to change the program name to "Agricultural & Medical Biotechnology". This change took effect in August 2016. A significant increase in incoming freshmen followed (Fall 2017) and has remained fairly steady since.
4. The review committee recommended establishment of an alumni database. As of the previous review, the program had made little systemic effort to keep in touch with graduates of the program. This has proved to be somewhat difficult, but we continue our efforts in this area. The University alumni office controls access to lists of graduates and does not support establishment of, for example, alumni listservs. As such, our efforts have been largely ad hoc, typically using professional/social online networks (e.g., LinkedIn, Facebook). AC Esther Fleming has developed an exit survey for graduating seniors that has been used to monitor professional outcomes and contact information. Because ABT only

has one staff member (Fleming) who focuses on more program-critical duties, we do not have the capacity to invest personnel and resources in this effort.

5. To accommodate and enhance growth of the program, the review committee recommended engaging with other colleges and units within the University. Approximately half of ABT students conduct independent research projects with faculty outside of CAFE, and approximately half of our student population identifies as "pre-professional". Several faculty in outside colleges (in particular the College of Medicine and College of Pharmacy) have been "repeat" mentors for our students—that is, they have mentored independent research projects for several different students from our program. While we acknowledge that many of our students are bound for careers in the broader biomedical field, all of our instructors and the vast majority of our academic advisors are CAFE faculty. From a practical perspective, it is extremely difficult to get faculty from professional colleges (e.g., Medicine, Pharmacy) to contribute to an undergraduate program as an instructor. We continue to engage interested faculty by putting them in front of students as we can, typically by inviting them to talk to students about their research in lower-level ABT courses (e.g., ABT 101 and ABT 201). Further, with the addition of "Medical" to our program name, we have now begun to include faculty from outside colleges on our steering committee. For the 2021-2022 academic year, our steering committee includes two faculty from the College of Medicine and one from the College of Pharmacy.
6. The review committee recommended developing a formal process to regularly review curriculum offerings to ensure the curriculum is updated and relevant. This recommendation was rejected, as the program already has a mechanism by which the curriculum is reviewed.
7. The review committee recommended revision of the ABT webpage to make it more student-centered. The ABT webpage has been revised and is continually updated by our AC Esther Fleming. Since the last review, the program has begun to utilize Canvas for dissemination of relevant information to students, as this system is familiar and heavily utilized by students for course materials already.
8. The review committee recommended establishment of a physical "home" for the ABT program. Our AC Esther Fleming now has a separate office, that constitutes the "home" of our program. Her office is part of a suite within the Agricultural Sciences Center, which is the "home" building for CAFE, and includes many of the CAFE classrooms, the Center for Student Success, and areas where students typically congregate. Nonetheless, her office space is quite small and she has to use other space if meeting with more than one individual. Designated storage space for the program is limited. The program utilizes cabinet space in a hallway and storage space in laboratories of ABT-affiliated faculty members.
9. The review committee recommended offering a one-hour seminar in technical business writing and interviewing skills to improve professional development. This recommendation was rejected, as resources for improving these skills are available through the CAFE Director for Career Development and Academic Enrichment (this position was active during the 2014 review but was subsequently eliminated due to budget cuts) , and the University's Stuckert Career Center. Nonetheless, we have continued to enhance professional development opportunities for students. For example, we now have a curriculum-wide "CV project"

whereby students develop a CV as freshmen and revisit/update their CV annually in classes across the curriculum. Our AC Esther Fleming has established a weekly newsletter that, among other things, includes information on professional development opportunities across the University.

10. The review committee recommended developing a more structured process, early in the program, that would jumpstart the matching of students with research mentors and labs. Independent research projects are a hallmark and strength of the ABT program, yet matching students with faculty research mentors has been an issue, especially as the program has grown considerably since the last review. Our AC continues to curate an updated list of faculty from across UK who have mentored ABT students, and this list is available on the ABT webpage. ABT 201, typically taken during students' sophomore year, exposes students to research from faculty across the University, and the instructors have developed an ABT 201 "mixer" during which students are able to engage with interested faculty in an informal setting. Nonetheless, this does continue to be an area that can be improved and is routinely a topic of discussion among program leadership.

## Current challenges, constraints, and needs of the program

1. **Staffing needs**. The ABT program has one dedicated staff member, our AC Esther Fleming. Esther transitioned from a 50% staff, 50% research position to full time staff in Fall 2014 following recommendations from our most recent program review. We ended the 2013-2014 academic year with an enrollment of 172 students. We ended the 2020-2021 academic year with an enrollment of 236 students. We are extremely fortunate to have Esther as part of our program. She is organized and efficient, hard-working and personable, and she is the face of our program for both students and faculty. She also takes on the work of three people. Her official job responsibilities, as per her University Performance Review guidelines (Major Job Responsibilities), comprise 60% "Academic Coordinator", 30% "Communication and Outreach", 5% "Academic Liaison", and 5% "Professional Standards, Customer Service and Organizational Improvement". A subset of the work she takes on is included below for reference. Esther compiles data on student matriculation, overall enrollment, and trends that we use for adding new course sections as needed. She coordinates a database of available scholarships, awards, and jobs for students. She curates separate Canvas pages for students and faculty, and uses both Canvas and e-mail listservs to share essential and timely information for both students and faculty. She attends meetings and contributes to both the undergraduate ABT club and the ABT steering committee. She compiles data necessary for our annual assessment report. She coordinates and attends ABT 101 during Fall semesters. A significant portion of this course is devoted to sharing programmatic information with students, advising students, cohort-building, and sharing information on scholarships, internships, shadowing and job opportunities, as well as outreach and volunteer opportunities. Esther organizes academic advising for all Freshman in ABT 101, which is done in groups during class. She meets with each Freshman individually to develop a 4-year plan using a spreadsheet that she developed. Esther also attends ABT 201 in Fall

and Spring semesters to keep apprised of potential research mentors for students. Esther organizes advising for all incoming freshmen. At the end of the 2020-2021 AY, she was the permanent academic advisor for 34 students (16% of our total population), and this group is comprised of students with unconventional or otherwise difficult advising needs (e.g., athletes, transfers, returning students, poorly performing students). Esther coordinates assigning freshman students to permanent academic advisors. She reviews all degree audits and verifies status for all students who intend to graduate in any given semester. Esther plans our graduation celebrations. She maintains our program website and coordinates with the CAFE social media manager. Esther is largely responsible for all of our dedicated ABT outreach efforts, including recruitment at UK and CAFE sponsored events. She developed and implemented a Qualtrics survey for graduating seniors, and she maintains a spreadsheet for data tracking. She actively pursues interactions with graduates through professional and social media websites. She additionally puts together and circulates a newsletter that is put out every Friday for the benefit of both ABT students and faculty (see example in appendix 8). I will point out here that should Esther leave the program, there is no way we could find one person to take on all of these responsibilities.

As we envision it, our program would ideally have three staff members. In addition to Esther, who would retain her role as AC and continue her work with advising and student care, we would have one individual responsible for "onboarding" and sharing work with recruitment and freshman advising, while the other would focus efforts on "outward facing" responsibilities such as internships and industry relationships, as well as matching students with research advisors. These issues are further discussed below.

2. **Issues arising from the interdepartmental nature of the program.** As an undergraduate program that lacks a departmental "home", we are dependent not only on the goodwill of the department chairs from our partner departments, but also on their human resources. We have been fortunate to enjoy good working relationships with our affiliated departments, but it is not hard to envision a scenario where a department may choose to prioritize another undergraduate program. For example, one of our affiliate departments may decide to focus faculty effort on either a new undergraduate degree/certificate program, or to reallocate resources to ensure success of an existing major that is owned by the department. This is especially pertinent in light of a changing budget model in which departments are rewarded for total student contact hours. Ideally, we would like some sort of contractual protection for existing faculty who devote effort to our program, as well as prioritization of faculty hires with a contractual link to ABT. Similarly, faculty effort devoted to advising can be substantial, based on the number of students advised. Typically, faculty would advise between 4-8 students per semester. With program growth, yet a limited number of faculty affiliated with the program, this number stands to increase.

   TA lines are held at the college level and disbursed through departments within CAFE. TAs are not as plentiful in CAFE as they are in, for example, the College of Arts & Sciences at UK. As a result of our previous review, the ABT program was awarded one half TA line (i.e., one TA for one semester). We currently use this TA for ABT 120, which

has two 30 student lab sections. Our other lab course (ABT 495) currently has three sections (two in Fall, one in Spring), and TA help is essential for operation. Enrollment increases necessitated addition of the second Fall section. For the past two years, we have been operating with two TAs total for the Fall, and two TAs total for the Spring. These TAs have been PhD students from either the Plant & Soil Sciences department (home department of two of the three ABT 495 instructors) or from the Entomology department (home department of the third ABT 495 instructor). We are, once again, dependent on departmental chairs for this allotment. We have been able to secure "volunteer" TAs who serve in order to gain teaching experience, and Entomology graduate students gain credit for this as ENT 770 (Teaching Entomology). This ensures that their transcript shows evidence that they have participated in college-level teaching. Such a course does not presently exist for Plant & Soil Sciences, but this should be explored in the future.

3. **Issues arising from program growth.** Program growth has necessitated a number of changes to the way we operate. Perhaps the most apparent is adding new sections of existing classes (additional sections of ABT 201, 301, 360, 460, 461, and 495 have been added since our previous review). We are fortunate to have identified instructors to fill these sections among our affiliated departments. We have been successful in adding new faculty affiliates to serve as instructors and as academic advisors, this has been largely fulfilled by recruiting newly appointed faculty in CAFE. We currently find our resources stretched with program operations that were established in a different time with fewer students. This can be seen with the increasing workload of our AC (described in *1. Staffing Issues* above), as well as with difficulties identifying research mentors for our students (described in *5. Identifying research mentors for students* below).
   We have had to make some changes to course structure on account of available space, and it remains a balancing act in our lab classes to accommodate a larger population of students while retaining the "small program" feel. For example, ABT 120 (our Freshman lab course) is taken by all ABT students during their second semester. The lab space for this course can comfortably accommodate up to 30 students. ABT 120 instructor Lou Hirsch currently teaches two sections of this course, but this is always dependent on incoming class numbers. With incoming classes averaging between 60-70 students, we run the risk of not having enough spaces for everybody in two sections of ABT 120. Adding a third section is a decision that would need to be made in the Fall, prior to publication of the Spring course catalog, and would add an additional burden for an already over-burdened ABT faculty member.

4. **Under-prepared students.** Students enrolling at UK declare a major prior to matriculation. Students are advised according to their declared major during the summer before they enroll, and will be aware of the requirements for their chosen major. The University of Kentucky has, by most measures, a high acceptance rate for student applicants. While some academic programs at UK have restricted admission policies, ABT does not. This means that we enroll students every year who have a

difficult path to graduate with an ABT degree. For example, students with low math ACT scores have, based on anecdotal evidence, a high probability of leaving our program prior to graduation. This is, in part, based on the fact that these students are not placed into introductory chemistry, which is a prerequisite for nearly every other course in the curriculum. As such, these students may find themselves behind and, under the best circumstances, will not graduate in 4 years. More practically, however, these students have likely not been adequately prepared for the rigors of the ABT curriculum. As described in the *student demand* section below, Academic Common Market students are at a particular disadvantage owing to their specific requirements for getting in-state tuition.

5. **Identifying research mentors for students.** As described above, ABT students are required to conduct an independent research project. This is typically done in the laboratory of a UK faculty member (ABT 395), but can also be done outside UK (ABT 399) at a company or another university. At UK there is a limited number of faculty who are willing to engage undergraduate students in their research program. There is a curated list of faculty who have served as research mentors for ABT students on the ABT website (https://abt.ca.uky.edu/mentor_list). This list is continually updated by our AC Esther Fleming after each semester, and consulting this list is a simple "first step" for students as they navigate this process.
   Students are aware, early in their progression, that they need to find a research mentor for ABT 395. This is advertised as a hallmark of our program during recruitment, and students will learn more about this during ABT 101 (1st semester). ABT 201 (typically taken in their 3rd semester) is designed to facilitate finding a mentor by bringing in faculty from across campus to talk about their research, as well as hosting a "mixer" where interested faculty are invited to interact with students in an informal setting. Students are required to have identified a research mentor for ABT 301 (taken as early as their 4th semester), thus there is some pressure (and student anxiety) during their second year in this regard. Our recent program change now has ABT 394, our new "research onboarding" 1-credit course, as a pre- or co-req with ABT 301. This is meant to ease students into their independent laboratory research project, but does not necessarily help with finding a mentor. In addition to our curated list of mentors, students are encouraged to explore departmental websites to identify faculty whose research matches their interests. Academic advisors can play an active role in this as well, by a) pushing their advisees to begin this process early, b) directing students to certain departmental websites based on their interests, and c) reaching out to UK colleagues on behalf of a student. This is not codified in the roles for academic advisors, though, and some students may not get the help that they may need from their advisor. Many students will be proactive and identify mentors early. At the other end of the spectrum, some students will register for ABT 301 without having identified a research mentor and may find themselves having to drop the class because of this. As a result, academic advisors (or program leadership) often find themselves spending time on last-minute requests to identify research mentors, and there are some program-affiliated

faculty that end up being the "last resort" mentors, which is not beneficial for the student or for the faculty member.
The increase in both student numbers and diversity in career interests means that we need to identify more opportunities for student research both on and off campus. We are fortunate to have faculty advocates in many departments who will not only mentor students, but encourage their departmental colleagues to mentor ABT students. Our DUS Lou Hirsch has reached out to "new" departments (i.e., those whose faculty may not be aware of our program) and has had some success advertising our program. Similarly, he researched and contacted local biotechnology companies in an effort to secure student placement as interns. This effort has had a more modest effect. Indeed, more could be done on this front, but Lou's time and efforts are required with more program-immediate responsibilities.

6. **University Scholars Programs (USPs) and PharmD program connectivity.** As described in the *student demand* section below, the ABT program has one established USP with the Master's in Medical Sciences program, which is an umbrella MS program for six departments in the UK Medical School. This is an outstanding recruitment tool and is beneficial for ambitious students looking for a fast track to a MS degree in biomedical sciences. USPs should be sought with other graduate programs, especially those from ABT-affiliated departments. This may also have the benefit of growing or sustaining student numbers in graduate programs with low enrollment. Unfortunately, there is not a "one size fits all" process for developing these programs, as they will differ according to the requirements for each graduate program. Nonetheless, with the large number of ABT students who qualify for this *and* conduct research in ABT-affiliated departments, this should be made a priority. We currently have a draft for a USP with the Integrated Plant & Soil Sciences graduate program, which is the combined graduate program for faculty in the Plant & Soil Sciences department and the Horticulture department. Developing a track whereby ABT students can enroll early in the UK PharmD degree program, also described in the *student demand* section below, and fulfill their remaining requirements for a BS degree in Agricultural & Medical Biotechnology should similarly be made a priority. We currently have a draft in place, but more effort will be required to finalize the proposal and get it through the Undergraduate Curriculum Committee and UK senate for approval. As with many of the "needs" listed in this section, the faculty and staff effort needed to finalize this is extremely limited owing to their other responsibilities.

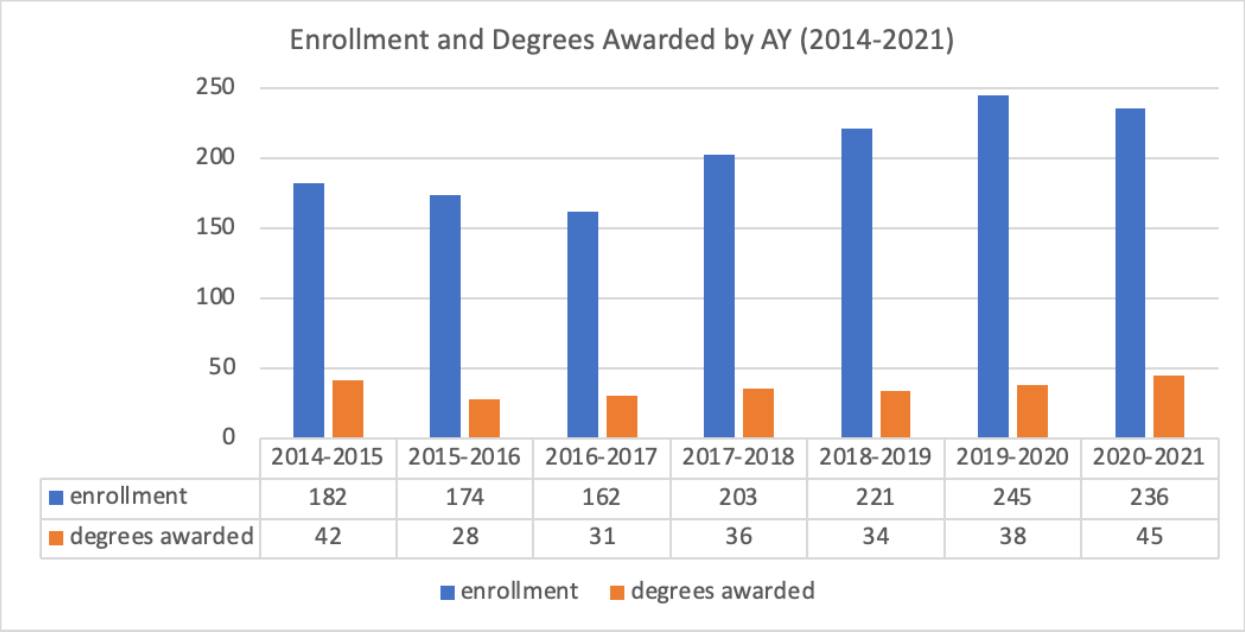
7. **Tracking post-graduation student outcomes.** The university does not support developing alumni databases for individual programs. As such, our efforts here have been ad hoc. AC Esther Fleming has done a tremendous job, though, through the use of a graduate exit survey and through the use of available social media (e.g., LinkedIn) to keep track of our graduates. Ideally, we would like to keep data on student outcomes and be able to keep track of our graduates as they move on to their own successes. All UK graduates retain a special connection with the University – we would like for them to remain connected to their undergraduate program as well.

8. **Perceived lack of consistency in courses with different sections, or courses taught by different instructors.** This was brought up in our steering committee discussions by the undergraduate representative to the ABT steering committee. Program growth necessitates addition of more sections for most courses, and courses that were formerly taught by one instructor during one semester are now taught by different instructors in different semesters. For example, ABT 495 (our senior-level laboratory capstone course) now has two sections in the Fall semester and one section in the Spring semester. This was a one section, Fall-only course as of the previous program review. Each of the three sections is currently taught by a different instructor. While the experimental work in the lab, the format of the course, and the grading rubric remain the same, differences in individual instructor grading styles may result in different outcomes for the "average" student. ABT 460 (Introduction to Molecular Genetics) has four instructors for two sections (instructors alternate on even-year/odd-year cycles). Currently we do not have a plan in place ensuring consistency in content and grading between the four instructors. With six sections of ABT 301, we have attempted to normalize the course content and grading by appointing one of the six instructors as a course "coordinator". Other courses in the curriculum could benefit from similar reflection.

9. **Recruitment.** As described above, staff and faculty effort are necessarily devoted to other areas of program operation. Recruitment for our program, as with other CAFE undergraduate programs, has been largely handled through the work of individuals in the CAFE Center for Student Success. This has worked well for us, and we are grateful for their effort on our behalf. As of this review cycle, it is not clear whether we can realistically accommodate more students at this time with current resources. Nonetheless, recruitment should be an area of consideration for the future of our program.

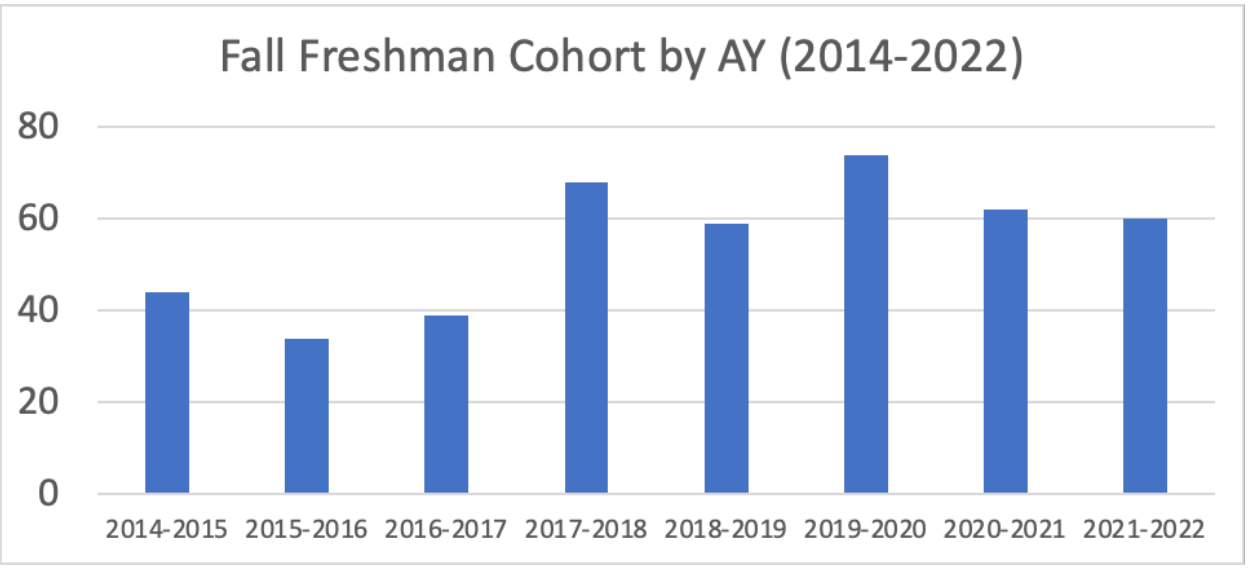
## Student enrollment and degrees awarded

Since completion of the last review (AY 2013-2014), the ABT program has grown steadily. Enrollment at the end of the 2020-2021 AY is 37% greater than the 2013-2014 AY (from 172 to 236), with the largest single year increase coming during the 2017-2018 AY (162 to 203) which coincides with the program name change to "Agricultural & Medical Biotechnology". While we believe that the name change played a major role in the increase, this also coincides with hiring of our full-time academic coordinator Esther Fleming. During Fall 2015, CAFE hired a Director of Student Relations (Wayne Centers) and a Marketing and Communications Manager (Seth Riker), their continued efforts have no doubt had a positive impact on recruitment and retention.



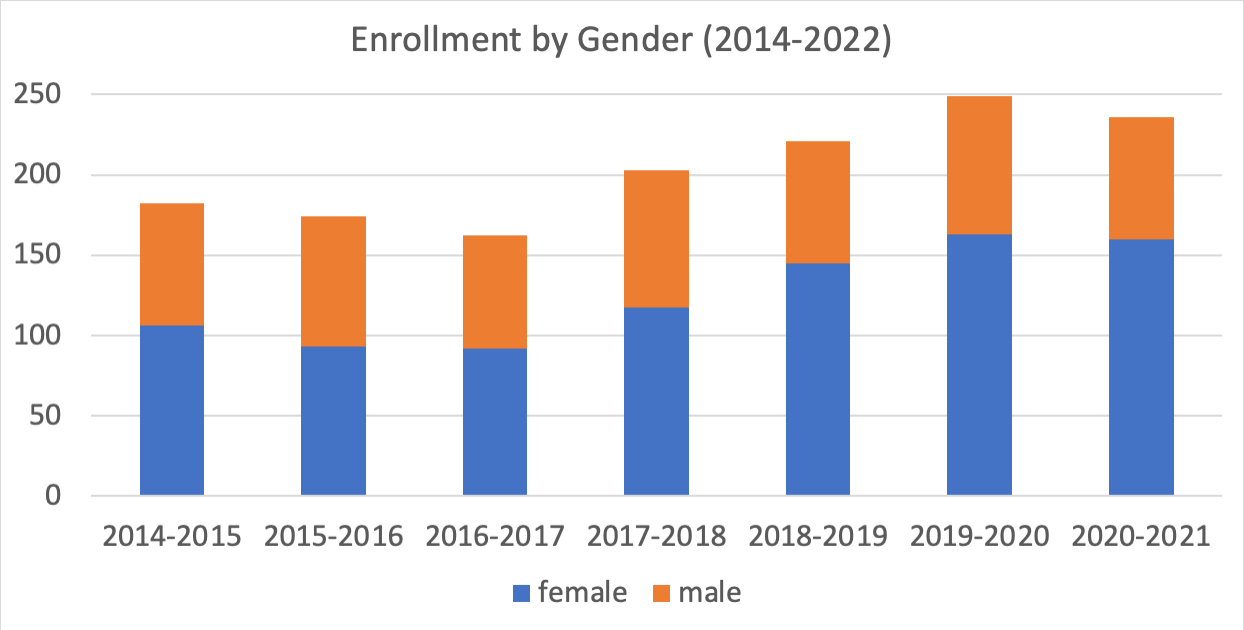

The above chart shows degrees awarded and total enrollment over the period since the last review. In addition to enrollment, degrees awarded increased gradually from the 2015-2016 year (28) to the 2020-2021 year (45).

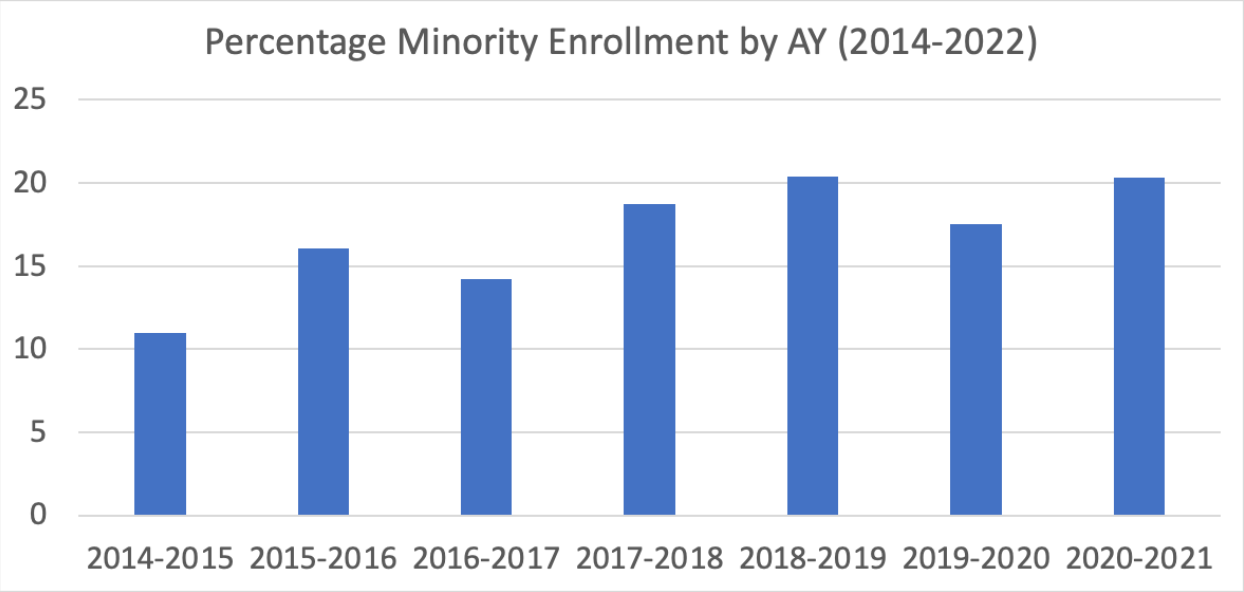
Incoming Freshman cohorts have likewise increased since the most recent review, with the greatest increase seen in Fall 2017. This was the first AY following our name change. Incoming numbers have been steady around 60-70 over the last 5 years, as seen in the figure below.

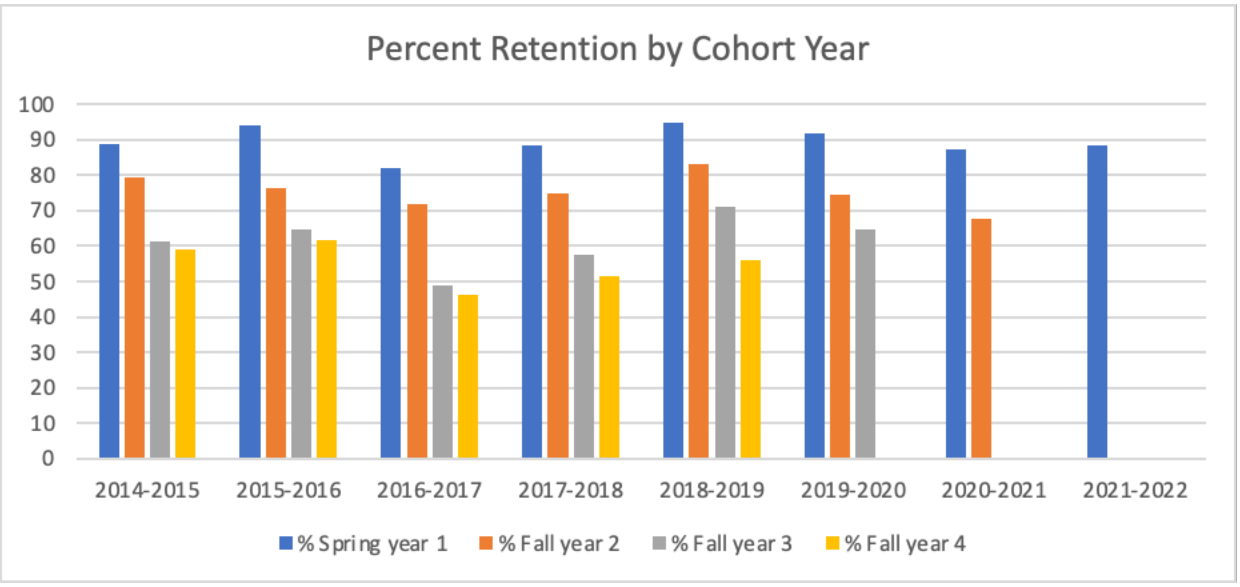



During the period since our last review, the relative ratios of female/male students has increased (currently at 68% female) and the proportion of self-identified minority students has increased (currently at 20%). The increase in female students has mirrored a general trend in

universities across the country, however the proportion of female students in the ABT program outpaces that of UK in general (currently at 58%). Minority enrollment is further discussed in the Diversity, Equity and Inclusion section below.

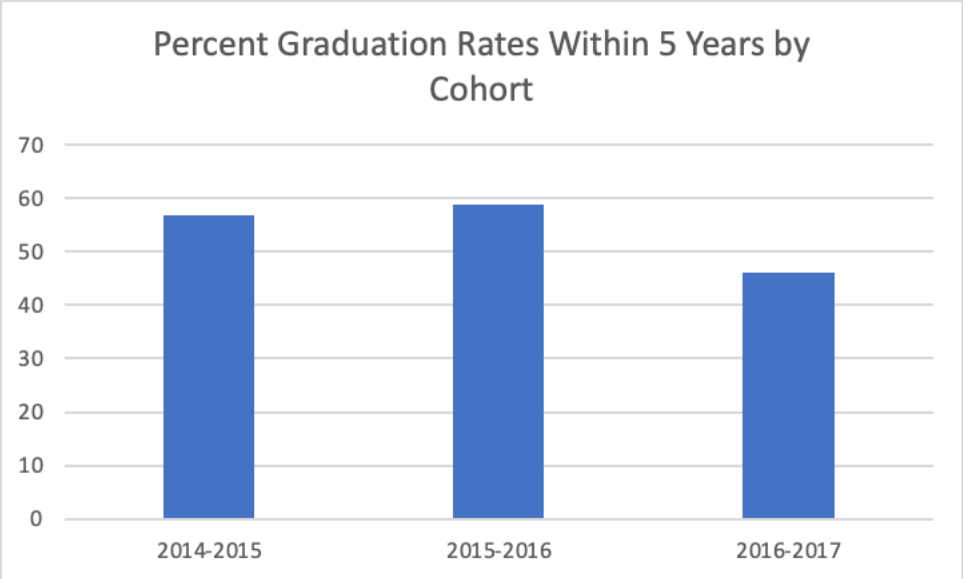





Program attrition (figure above) is most pronounced during the first year, with ~90% retention after the first Fall semester that drops to ~75% after the Spring semester. Anecdotal evidence over the past 5 years suggests that we have a similar rate of transfers *into* the program over the first year, though, leaving an overall student population entering year 2 that is similar in number to that entered in the Fall of year 1. It is perhaps worth noting that some ABT students leave the program prior to graduation if they are accepted to a PharmD program. These students are statistically included in the "dropout" category. A summary of awards received by ABT students is found in appendix 9.

The overall percentage of students that entered the program in year 1 and graduate within 5 years is shown below for the Fall 2014, Fall 2015, and Fall 2016 cohorts, and was between 55-60% for those students matriculating in Fall 2014 and Fall 2015. Note that the 2016-2017 numbers do not include those students scheduled to graduate in Spring 2022. Our 5-year graduation rate is slightly lower than the current average for CAFE undergraduate programs (67%)




## Student demand and recruitment

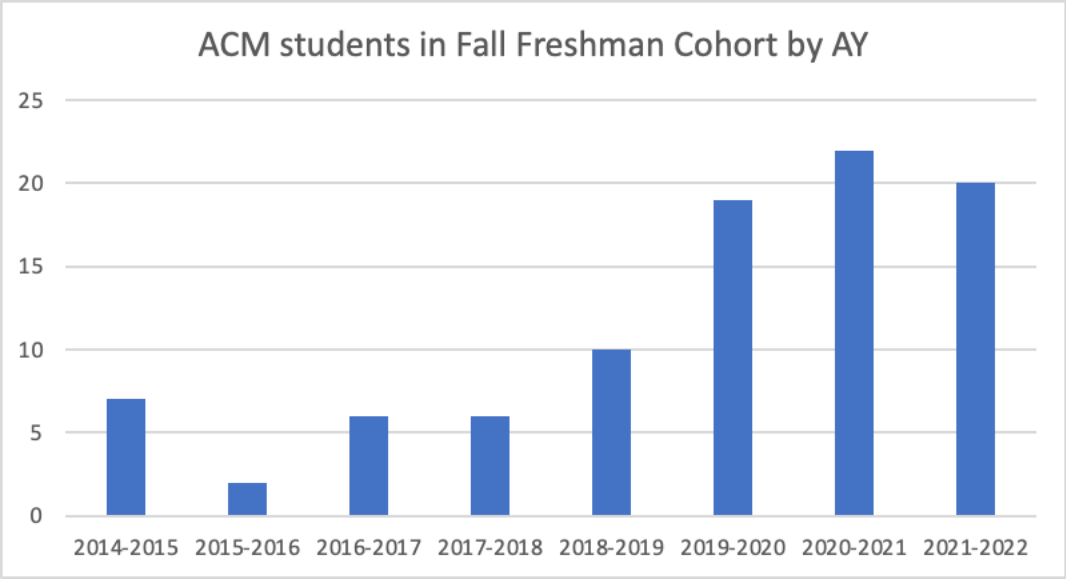
Student recruitment for the ABT program is largely an ad hoc process, outside of dedicated CAFE recruitment efforts. We do not have the personnel within the program for sustained and dedicated outreach and recruitment, yet we do participate in organized on-campus events aimed at recruiting students during university- and CAFE-sponsored events. Nonetheless, increasing program enrollment over the most recent review period presents strong evidence for student demand. While we do not have data to provide a definitive explanation, the increase in student numbers is at least partially linked to the addition of "medical" to the Agricultural & Medical Biotechnology degree name, as the increase in Freshman matriculation during Fall 2017 and since has demonstrated. A larger student population also points to higher awareness among incoming students of the major, and this is likely due in part to word-of-mouth advertisement among current students and graduates, CAFE and ABT program outreach, and the relatively new tool available on the UK website allowing incoming students to search for majors based on career interests. This tool is especially valuable for ABT, as incoming students may not have heard about ABT but would certainly have heard of comparable majors such as Biology and Chemistry. An example of the materials we provide to prospective students is available in appendix 10. The increase in student numbers in the ABT program has occurred at a time of overall enrollment growth at UK, yet this increase likely also comes at the expense of numbers in other comparable programs such as Biology (College of Arts & Sciences, enrollment 1,228) and Animal Sciences (CAFE, enrollment 250), each of which has a larger student population. A summary of the college's top five majors by enrollment is found in appendix 11.

Approximately half of our students identify as pre-professional, with the highest number within this group identifying as pre-med, followed by pre-pharmacy and pre-vet, and others identifying as pre-optometry, pre-physician's assistant, and even pre-law. Our program maintains excellent ties to regional professional schools and graduate programs, and we enjoy a very good reputation with them owing to the success that our students have had and the number of students from our program that ultimately enroll. Students who apply for professional or graduate school nearly always intend to stay within the region. However, students may be at a disadvantage if they opt to apply to professional or graduate schools outside of our region, as many schools may not be familiar with our program and the quality of the students. For example, students with a degree in "Biology" or "Biochemistry" will have a degree with "name recognition", and its implied coursework, whereas the curriculum for a degree in "Agricultural & Medical Biotechnology" may not be immediately apparent to those reviewing student applications. Pre-professional advising flyers provided to students are found in appendix 12.

Students can qualify for professional programs through many majors at UK, and we strive to keep apprised of developments in these other programs that may put our students at a disadvantage when competing for limited positions. Any new programs that market themselves as a more ideal pathway to professional schools could cut into our enrollment.

*Academic Common Market*

The Academic Common Market (ACM) of the Southern Regional Education Board is a multi-state program that allows for students to get in-state tuition at out-of-state universities if they choose to major in a discipline that does not have a comparable major at universities in their home state. The purpose of the program is to allow students to obtain an education in a specialized field without having to pay for out-of-state tuition. Kentucky is one of the 15 Southeastern US states that participate in the ACM, along with AL, AR, ***DE***, FL, ***GA***, ***LA***, ***MD***, MS, OK, SC, ***TN***, TX, VA, and ***WV***. The Agricultural & Medical Biotechnology major qualifies for the in-state tuition rate for students from the six states above listed in ***bolded italics***. We have seen a significant increase in ACM students in the incoming Freshman cohort in the review period (Fall 2014-Fall 2021, see figure below). For example, the Fall 2021 Freshman cohort of 60 total students was comprised of 20 ACM students. Indeed, the Agricultural & Medical Biotechnology program accounts for 17% of the total number of ACM students at the University of Kentucky. While the ACM opportunity has been a boon to our program in elevating student numbers while diversifying the ABT student population, ACM students who struggle academically may find themselves in a precarious position. In order to retain their in-state tuition status, they must remain in the ABT program or transfer into another program that likewise qualifies for in-state tuition. Depending on their state of residence, this may prove to be a difficult proposition.




*UK Undergraduate Certificate Programs and University Scholars Programs*

Some newer developments at UK that students in the ABT program have taken advantage of include University certificates as well as University Scholars Programs. These are both mechanisms for student professional development as well as tools for recruitment of students.

Undergraduate certificate programs are college-level programs that are cross-disciplinary in nature, and, while short of a baccalaureate "degree" status, offer students the opportunity for skill and career enhancement in specific relevant areas. Certificate programs are fairly flexible, including coursework from different departments, yet typically require a student to take between 12-20 credit hours from a list of approved courses. Students in the ABT program may opt to explore many different certificates, but the most popular is the certificate in Distillation, Wine and Brewing Studies (https://dwb.ca.uky.edu/). The distilled spirits industry is growing rapidly in Kentucky, and graduates find well-paying jobs in this industry.

University Scholars Programs (USPs) link undergraduate and graduate programs, allowing for students to fulfill both an undergraduate and MS degree in a total of 5 years (so-called 4+1 programs). In this case, a student would take courses in their 4$^{th}$ year that would fulfill both MS and BS degree requirements, while simultaneously conducting research towards their MS degree. The ABT program has one approved USP, with the MS in Medical Science (MSMS) degree program. A brochure advertising this program is included as appendix 13 in this document. The total number of hours required for the USP is as many as 12 credits lower than what would be required for the sum of hours for the ABT program and the MSMS program separately. Students apply during their Junior year, are required to have a GPA of at least 3.5 within their major field and 3.2 overall, and must have a research advisor within one of six participating departments in the College of Medicine (Neuroscience; Pharmacology and Nutritional Sciences; Molecular and Cellular Biochemistry; Microbiology, Immunology and Molecular Genetics; Toxicology and Cancer Biology; Physiology). USPs require significant

planning on the part of the ABT student and are most practical for ambitious students who start at UK with some AP or transfer credit. Students should know fairly early on in their academic career that they intend to apply for this opportunity, and ideally would start conducting research in the lab of their choice before applying during their junior year. While our current USP is a great opportunity for students interested in biomedical research, the MSMS is not suitable for students interested in research in different disciplines. We are in the process of putting together USPs with graduate programs in CAFE (Departments such as Plant & Soil Sciences, Plant Pathology, Entomology, Veterinary Science).

*UK PharmD Pathway*

Likewise, the ABT program has been in talks with the UK School of Pharmacy to develop a program whereby ABT students can be admitted to their PharmD program early, yet still fulfill requirements for a BS in Agricultural & Medical Biotechnology. PharmD programs do not require that a student have a baccalaureate degree prior to matriculation. As such, some ABT students will be part of the ABT program as a means to fulfill course requirements that are necessary for early entry into the PharmD program. If these students gain early entry into the PharmD program, there is no impetus for them to continue taking courses that would finish out their undergraduate degree. These courses would not count towards their PharmD degree. Students in this scenario are, by necessity, motivated and high-achieving students, yet they never receive their BS and are statistically noted as "dropouts" who leave the program prior to degree completion. The dual ABT/PharmD degree program (tentatively nicknamed the "Farm to Pharm" program) would allow them to complete ABT requirements by taking a specific selection of Pharmacy School courses that would substitute for upper-level ABT courses.

*Community College Pathway*

Bluegrass Community and Technical College (BCTC) is a 2-year community college in Lexington, KY, located just a few miles from the UK campus. Historically, BCTC graduates who opt to continue their education at a 4-year institution would likely attend UK following graduation from BCTC. There are several advantages that BCTC students would have attending UK, including a waiver for UK Core courses—meaning that graduation from BCTC automatically fulfills all UK Core requirements. BCTC offers a Biotechnology Laboratory Technician AAS program (https://bluegrass.kctcs.edu/education-training/program-finder/biotechnology.aspx) that is meant to train students to move into the workforce as entry level lab techs, but this also provides a logical link to ABT for students wishing to further their education. We have established a transfer pathway with BCTC that outlines a clear path from AAS in Biotechnology to BS in Agricultural & Medical Biotechnology in a total of 4 years (see appendix 14). This pathway may be attractive to financially disadvantaged or first-generation students. Incidentally, the new (as of January 2022) BCTC Biotechnology program coordinator (Dr. Audrey Law) is a UK ABT graduate and former postdoc in the lab of ABT SC chair Luke Moe, which should serve to strengthen ties between the programs in the future. A chart of transfer student enrollment data is found in appendix 15.

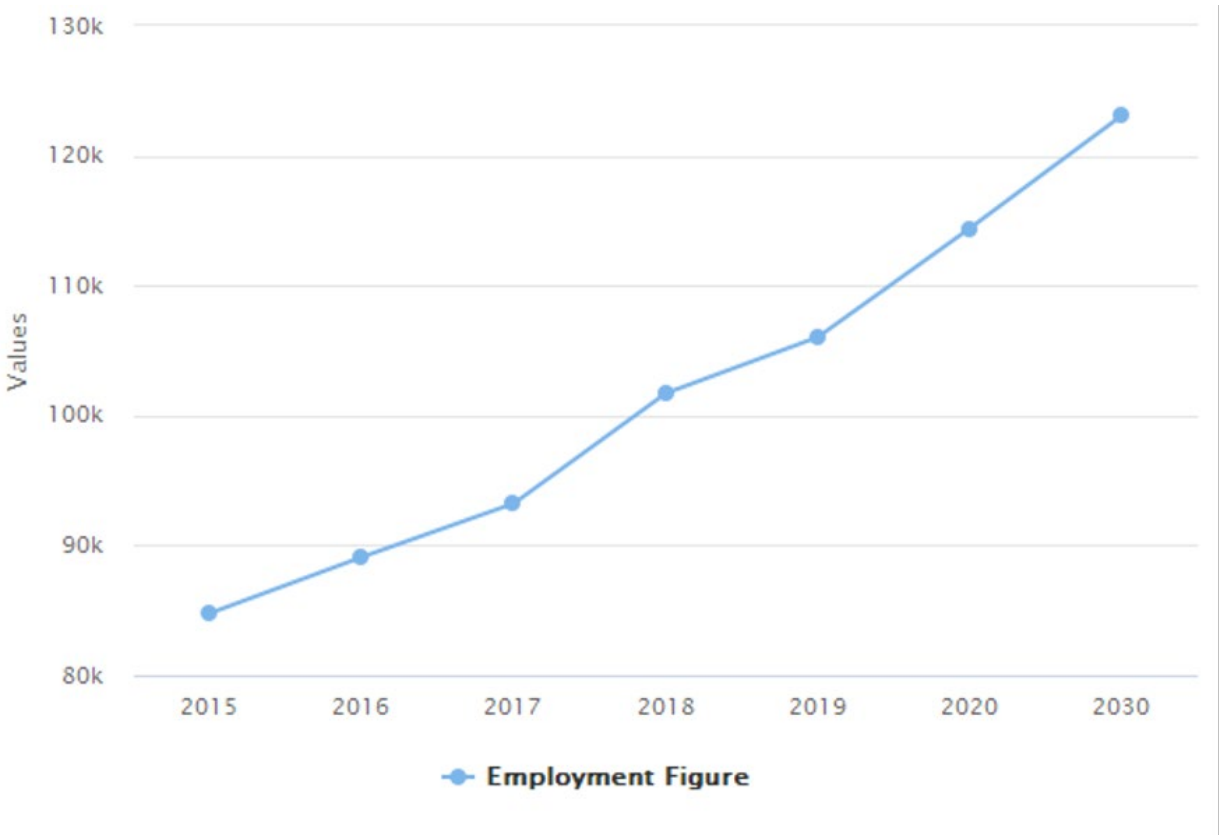
## Employer demand

Academic Coordinator Esther Fleming has developed an exit survey for graduating ABT seniors that has been administered for the last 10 years. This data (n=280) shows that 51% of students are bound for further education (including professional schools and graduate school), 24% have secured employment, 17% are "unknown" (i.e., those that did not respond to the survey), and 8% are seeking employment or exploring the possibility of graduate work. We do not have the resources to reliably track students once they leave our program, nor do we have the resources to collect data on the success of students who are seeking admittance to graduate/professional school. It would not seem prudent here to discuss employer demand for students who graduate and pursue further education, so we will focus the remainder of this section on employer demand for students graduating with a BS in Agricultural & Medical Biotechnology.

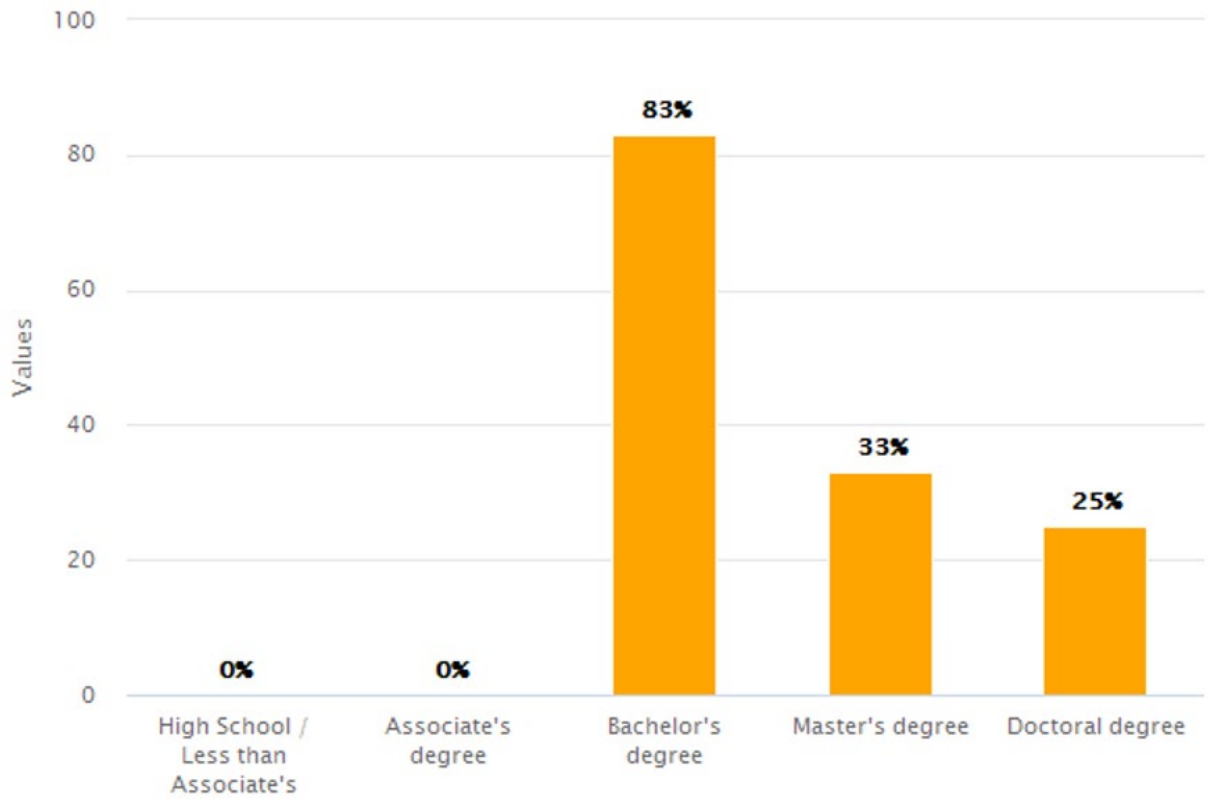
Burning Glass is an analytics software company that provides data and research on trends in job growth across multiple sectors. This tool is used by the University of Kentucky to establish data on availability of jobs, expected salaries, and projected employment growth for graduates. The ABT program is multidisciplinary, and graduates pursue work in a wide variety of careers. These include, among others, biotechnology, healthcare, agriscience, teaching, distilled spirits production, government work, and University jobs. As such, the burning glass data present an imperfect snapshot of employer demand. Nonetheless, Burning Glass provides valuable data on employer demand where this would not be otherwise available.

The data below was compiled using the "Biotechnology" Classification of Instruction Program (CIP) code 26.1201, which is defined by the National Center for Education Statistics as "A program that focuses on the application of the biological sciences, biochemistry, and genetics to the preparation of new and enhanced agricultural, environmental, clinical, and industrial products, including the commercial exploitation of microbes, plants, and animals. Includes instruction in bioinformatics, gene identification, phylogenetics and comparative genomics, bioinorganic chemistry, immunoassaying, DNA sequencing, xenotransplantation, genetic engineering, industrial microbiology, drug and biologic development, enzyme-based production processes, patent law, biotechnology management and marketing, applicable regulations, and biotechnology ethics" (https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=87804). This CIP code is broad enough to encompass many of the career outcomes for students graduating with a BS in Agricultural and Medical Biotechnology, but is certainly not all-inclusive.

The chart below details job growth in "biotechnology" from 2015-2020, with projected job growth through 2030.




The median salary in the nation for graduates in “biotechnology” is $64,000, compared to the average living wage for Kentucky of $34,000. According to the Burning Glass data, 56,535 job postings were available in the last 12 months in the US. Demand for “biotechnology” graduates is highest in urban areas, specifically on either coast, compared to Kentucky. The highest number of postings was in California (10,284), followed by Massachusetts (4,336) and Texas (3,707). The job advertisements by educational attainment (chart below) shows that most jobs available are requesting BS degrees.




The top 15 baseline skills requested in job postings are indicated below.

| Skill | Postings |
|---|---|
| Research | 32309 (57.40%) |
| Communication Skills | 29443 (52.31%) |
| Teamwork / Collaboration | 17703 (31.45%) |
| Microsoft Excel | 14219 (25.26%) |
| Problem Solving | 13395 (23.80%) |
| Planning | 13008 (23.11%) |

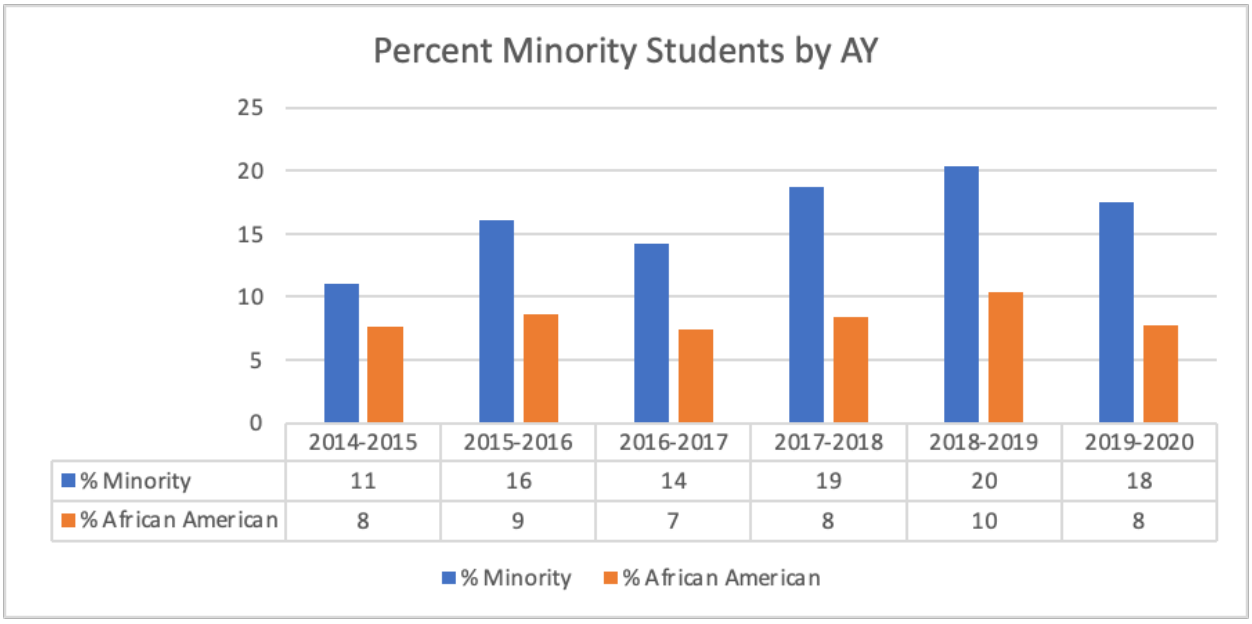
| | |
|---|---|
| Organizational Skills | 12467 (22.15%) |
| Writing | 12250 (21.76%) |
| Microsoft Office | 10928 (19.41%) |
| Computer Literacy | 10695 (19.00%) |
| Detail-Oriented | 10660 (18.94%) |
| Microsoft Powerpoint | 8358 (14.85%) |
| Building Effective Relationships | 7928 (14.08%) |
| Written Communication | 7620 (13.54%) |
| Verbal / Oral Communication | 7359 (13.07%) |

## Diversity, Equity and Inclusion (DEI)

The ABT program strives to create a welcoming and inclusive environment for all our students. Our program has historically had a diverse student population; however, we would benefit from a more deliberate reflection on the role of our faculty in enhancing DEI within the ABT program. It is true that faculty may participate in DEI educational programs through their own departments, but ABT faculty do not have specific DEI training, nor do we have a DEI working group. We, as an interdepartmental undergraduate program, do not have control over faculty hiring practices within departments, and we have limited control over faculty who choose to participate as academic advisors, research advisors, and instructors. While we do "recruit" faculty to participate in ABT, this is largely done with the goal of bringing in faculty who will serve as conscientious and responsive academic advisors, dynamic instructors who are knowledgeable and well-suited for our curriculum, and research advisors who are enthusiastic about supporting undergraduate research and will broaden the list of potential research areas for our students. An informal analysis indicates that of the 25 ABT-affiliated faculty (those that serve as academic advisors and/or instructors), one is African American, four are Asian, and one is Hispanic (6/25 = 24%).

Departments and programs within CAFE benefit greatly from the work of the CAFE Office of Diversity (CAFE OOD, https://diversity.ca.uky.edu/). The CAFE OOD offers outreach, education, and resources related to DEI, including DEI newsletters that are circulated to faculty 4 times per year. The University of Kentucky has a very active chapter of Minorities in Agriculture, Natural Resources and Related Sciences (MANRRS). ABT-affiliated lecturer Dr. Tonja Fisher is one of the advisors for the MANRRS chapter, and this chapter includes several ABT students.

Student statistics collected since the most recent ABT program review show the following statistics for minority student enrollment in ABT. The 2019-2020 AY is the most recent year for which both self-identified "minority" and "African American" student numbers were collected (for this data, the "minority" numbers include those who identify as African American). The percentages indicated below for the most recent AY are similar for ABT as compared to the overall UK undergraduate enrollment. For the entire UK undergraduate population, 7.1% of students identified as African American, while 25.3% identified as "minority", which, for the purposes of this dataset, includes the sum of students identifying as the following: American Indian/Alaskan Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian/Pacific Islander, Nonresident Alien, Race and Ethnicity Unknown, and Two or More Races. These data are from the UK Institutional Research, Analytics and Decision Support website (https://www.uky.edu/irads/enrollment-demographics). While we acknowledge that there are many different ways in which student diversity is represented within our program, we do not have statistics on other potential measures of diversity (e.g., LGBTQ+ status, socioeconomic status).




| | 2014-2015 | 2015-2016 | 2016-2017 | 2017-2018 | 2018-2019 | 2019-2020 |
|---|---|---|---|---|---|---|
| % Minority | 11 | 16 | 14 | 19 | 20 | 18 |
| % African American | 8 | 9 | 7 | 8 | 10 | 8 |

## Facilities

The ABT program has only one dedicated space, which is the office of our academic coordinator. This office is within the CAFE Center for Student Success (CAFE CSS; https://students.ca.uky.edu/), which is within the Agricultural Sciences Center North (Ag North). Ag North is the primary home for CAFE, housing not only the CAFE CSS but the administrative offices for the college and the majority of CAFE classrooms. Being housed within the CAFE CSS is beneficial in many respects, as it gives our AC easy access to the staff within this office (including, among others, the Assistant Dean of Advising, Assistant Dean of Academic Affairs, Exploratory & Pre-Professional Advisor, and Director of Academic Progress & Transfer Support). Nonetheless, the offices are in "cubicle" arrangement, which can make private conversations difficult, and are not large enough to meet with groups (e.g., students and parents for recruiting efforts). Additional space is available in Ag North for larger group meetings.

Classrooms and teaching laboratories are all "college level", and all ABT courses are housed within one of three CAFE buildings: Ag North, Garrigus, and the Plant Science Building. Lecture-based courses are mostly held in Ag North, while the ABT program uses laboratory space in Garrigus (for ABT 120) and the Plant Science Building (for ABT 495). The rooms for each course, along with the enrollment and cap, are listed below for the 2021-2022 AY. Sections at or above their respective caps are listed in ***bolded italics***. Capacities are set based on a combination of room space and other practical issues (e.g., realistic number of students given the grading load for an instructor). For example, courses that are part of our university mandated GCCR (ABT 201, ABT 301) are limited to account for the number of papers graded.

| **ABT Course** | **Fall 2021 location** | **Fall 2021 enrollment/cap (section)** | **Spring 2022 location** | **Spring 2022 enrollment/cap (section)** |
|---|---|---|---|---|
| 101 | Ag North, Seay auditorium | 58/80 | N/A | N/A |
| 120 | N/A | N/A | Ag North N24F (lecture)<br>Garrigus 106 (lab) | 27/30 (001)<br>28/30 (002) |
| 201 | Garrigus B-52 | ***40/40*** | Ag North N12 | 15/40 |
| 301 | Ag North A5<br>Ag North A6<br>Ag North S221 | 12/14 (001)<br>9/14 (002)<br>4/12 (003) | Ag North A5<br>Ag North A6<br>Ag North A6 | 8/9 (001)<br>***9/9 (002)***<br>8/9 (003) |
| 360 | Garrigus B-52 | 21/65 | Ag North N12 | 28/40 |
| 395/399 | N/A | N/A | N/A | N/A |
| 396 | N/A | N/A | N/A | N/A |
| 460 | Ag North N10 | 23/39 | Ag North N24F | 32/49 |
| 461 | Ag North N12 | 11/37 | Ag North N24F | ***52/47*** |
| 480 | N/A | N/A | N/A | N/A |
| 495 | Plant Science Building 109 | 12/21 (001)<br>18/21 (002) | Plant Science Building 109 | 19/20 |

ABT 120 is a 3-credit lecture-plus-lab course that most (if not all) ABT students take as a freshman during their second semester. This course typically has two sections of up to 30 students per section, and the sections share a lecture but have different lab times. During the Spring 2021 semester, ABT 120 was split into 7 sections of no more than 9 students per section to account for social distancing requirements (we are back to two sections during Spring 2022). Owing to the normal cap of 30 students per section, scheduling an even distribution of students can be difficult – especially as our incoming freshman class has averaged 60+ students per year over the last few years. Garrigus 106 comfortably seats up to 30 students and is suitable for introductory lab classes, but is not ideal for modern molecular biology work.

Plant Science Building room 109 is a more modern lab space that is well-suited for modern molecular biology research. The Plant Science Building is the newest CAFE building on campus (opened in 2003), and was designed as a research building, with limited space for teaching. The first floor has a lecture hall (typically only used for departmental seminars) and the other floors each have a large (~15 seats) and small (~6 seats) conference room. Room 109 is on the first floor and has a layout similar to research labs in the same building. The official room capacity is listed as 24, but under ideal circumstances courses would be limited to 20 or fewer students. There are 10 designated lab spaces and, under pre-covid circumstances, students would work in pairs in ABT 495 (i.e., 10 groups of two students). This course meets twice per week for 8 total hours, with the first ~30-45 minutes being an informal (white board) lecture and the remainder of the time spent in lab. During the 2021-2022 AY, the course has changed to account for social distancing, as the lab space is tight and we thought it best to have students work alone rather than in pairs. Students this year come in only once per week, so, for example, a section with 20 students would have 10 come in on Monday and 10 on Wednesday. Rather than the typical white board lecture, one instructor (Luke Moe) has put together a zoom lecture for each week. These lectures are available for each section, as it seemed unnecessary for each of the three instructors to independently create lectures. Students are expected to view the lecture, archived on Canvas, prior to coming to class.

All ABT courses are designed to be “in person”. While a considerable amount of work has gone into changes necessary during our covid year, our hope is that both lab classes go back to “normal” for subsequent academic years.

Other facilities used by the ABT program include those used for student research projects, such as faculty laboratories and the various UK CAFE research farms. While the review committee will have the opportunity to visit classrooms, teaching labs, and faculty research labs, it may not be practical to visit the farms, so we will make a brief note about them here. The Spindletop research farm (AKA the North Farm) has ~2400 acres and is ~9 miles north of campus. The following description comes from the Department of Plant & Soil Sciences website (https://pss.ca.uky.edu/north-farm): “Currently, the North Farm research includes initiatives, projects and programs in the departments of veterinary science, animal and food science, plant and soil science, biosystems and agricultural engineering, and entomology. The Kentucky Foundation Seed Project and Kentucky Seed Improvement Association are housed on the North

Farm." This farm hosts traditional agronomy research as well as the equine campus within CAFE. The UK Horticultural Research Farm (AKA the South Farm) is ~100 acres and is ~5 miles south of campus. The following description comes from the CAFE farms website (https://research.ca.uky.edu/content/SouthFarm): "Significant, applied research is ongoing at the University of Kentucky's Horticulture Research Farm in Lexington. Federal and state funded projects and trials covering traditional and organic vegetable production, high tunnel production, fruit production, variety trials for disease and pest resistance, cover crops and hops are all part of the research happening at the UK Horticulture Research Farm." In addition to horticultural research, the South Farm hosts the UK Community Supported Agriculture (CSA) program and the UK winery (https://winery.ca.uky.edu/), which is an important feature utilized by the Distillation, Wine, and Brewing Science certificate that has become popular with ABT students. There are other research farms scattered across the state, including two other research stations that are home to UK faculty and conduct applied research relevant to their regions. These are the UK Research and Education Center at Princeton (https://wkrec.ca.uky.edu/) in Western KY, and the Robinson Center for Appalachian Resource Sustainability (https://rcars.ca.uky.edu/) in Eastern KY.

## Budget

The ABT program has three separate accounts, each of which receives funds from different sources and is used for different purposes. We will provide a summary of each account below, and details for each account are provided as appendix 16. These data were compiled by Deb Ramey, who is the Scholarship and Financial Manager for the CAFE Center for Student Success. In addition to her role with the Center for Student Success, Deb manages the finances for interdepartmental programs in CAFE, including the ABT program. This arrangement places accountability for ABT finances with the college, which is different from undergraduate programs that are managed by individual departments. While Deb has been a tremendous asset to the ABT program and is always willing to take time to go over budget information, we lack the human resources that would otherwise be available to undergraduate programs that are department-owned. For example, purchasing and invoicing for materials used in our lab classes is done by the instructors of note for each class (or, more likely, their lab managers). While this system has been in place and working for many years, this is not part of the job description for research lab managers and takes time away from their other duties. The job of approving expenditures, deciding how funds are apportioned, and ensuring that accounts remain in the black falls to the ABT steering committee chair. We have been fortunate to remain in the black each FY since our previous review. It is also worth noting here that budget surpluses at the end of each fiscal year (FY) are typically returned to each account, minus a small tax. There is no guarantee that this practice will continue, though, with potential changes to state funding and uncertainty in college budgets.

The **ABT Support Account** is the primary source of funding for the program. This account is replenished by CAFE from state instructional funds on a yearly basis at the beginning of each FY.

Over the last six FYs (2016-2021), the budget allocated has increased incrementally each year (from $68,015 in FY16 to $71,538 in FY21) and has averaged $70,188 per FY. The support account is used to pay the salary of our academic coordinator, as well as to pay the one-semester stipend for the sole TA allocated to the ABT program (for ABT 120). This account is used for sundry items for the program, including office supplies, materials used in recruitment, and payment of honoraria for student awards. When surplus funds are available, this account has been used to fund professional development opportunities for our academic coordinator. When funds are available, this account is also used for purchase and maintenance of equipment for our lab classes. We typically have over 100 students enrolled per year in our two lab classes (~60 students in ABT 120, ~45 among three sections of ABT 495). These classes are taught in different lab spaces in different buildings, and transporting ABT-owned equipment between buildings for use on different days in different classes is impractical. As such, we were able to leverage funds available through the Department of Plant & Soil Sciences (home of SC Chair Luke Moe) with a match from CAFE to equip the Garrigus lab space with a sufficient number of pipettes, agarose gel apparatuses, vortexes, and heat blocks for 30 students. A similar strategy was used several years ago to purchase a BioTek Epoch2 plate reader for the ABT 495 teaching lab. Student inexperience and learning leads to inevitable wear and damage to lab equipment, especially pipettes, and we find ourselves needing to purchase or repair equipment each year. This is the only source of funds that can be used for general program needs.

The **ABT course fee account** is populated by student course fees from ABT 120 and ABT 495. Students pay $50 for enrollment in ABT 120 and $200 for enrollment in ABT 495–this is one account that houses funds for both courses and is used for lab supplies for each course (consumables, reagents, etc.). The course fee for ABT 495 was increased from $100 to $200 in FY18 to account for a newly developed RNA-seq course module, and this has remained in place since then. The new RNA-seq module in ABT 495 uses a single run of an Illumina DNA sequencing instrument per semester, and this accounts for the increase in the course fee. While accounting issues play a role in our observed budget surplus (i.e., billing from the DNA sequencing facility has been delayed into the new FY), it is apparent that the gradual increase in funds rolled over for each FY suggests that the program should revisit the fees for each student for each class, in particular for ABT 495. Funds from the course fee account are specified for use only in direct course-related activities, and do not represent a potential source of income for use in other areas of program need.

The **ABT Summer school account** is populated by returns from the University for student enrollment in ABT summer courses. The only courses for the ABT program that are offered in the summer are research courses (ABT 395/399 and ABT 396). Summer enrollment by FY in the last five years is indicated in the chart below.

| Enrollment | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 |
|---|---|---|---|---|---|---|
| ABT 395 | 0 | 0 | 2 | 0 | 1 | 6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ABT 396 | Not offered | Not offered | 1 | 1 | 0 | 1 |
| ABT 399 | 0 | 0 | 0 | 0 | 0 | 0 |

Owing to University-designated practices that limited undergraduate students in laboratories during COVID-19, enrollment in ABT 395 and 396 was limited in FY19 and FY20, but we saw an increase in FY21. Our current balance in this account is over $2,000. As returns on summer school enrollment is a fairly new development, we have not designated these funds for a specific purpose, but expenditures on summer school accounts are fairly restrictive and cannot be used as a source for areas of general program need. The amount returned is not sufficient to pay summer salary for faculty on 9-month appointments, which would be a worthwhile use of these funds–especially as we try to identify faculty to manage the summer research courses. We have been rolling these funds over for the last few FYs, and ABT leadership should prioritize finding a useful way to spend these funds in light of the possibility that they may be returned to the college if not used in the future.

## Appendices

1. ABT Standar 4-year plan
2. ABT-prefixed syllabi
3. ABT major program change proposal
4. ABT Program-level student learning outcomes plan and results report
5. Faculty and Staff Awards
6. Names/affiliations of ABT 395 advisors (research mentors)
7. List of publications by research mentors
8. Example ABT newsletter
9. ABT student awards
10. Prospective student packet
11. CAFE top five majors by enrollment
12. Pre-professional advising flyers 2022
13. MSMS brochure
14. BCTC to ABT transfer pathway
15. ABT transfers enrollment data
16. ABT budget

# Agricultural and Medical Biotechnology

## College of Agriculture, Food & Environment

N6 Agricultural Science Center Contact: Wayne Centers - dsr@uky.edu

Our agricultural and medical biotechnology (ABT) students have a variety of interests, but they all share one thing in common: they want to use science to improve lives around the world.
**Total Hours Required for Degree: 120 - 128**

## Freshman Year Credit Hours: 31

| FALL SEMESTER | 16 | SPRING SEMESTER | 15 |
|---|---|---|---|
| ABT 101 \| ABT 101 - INTRODUCTION TO BIOTECHNOLOGY | 1 | UK Core - Comp. & Comm. II | 3 |
| GEN 100 \| GEN 100 - ISSUES IN AGRICULTURE, FOOD AND ENVIRONMENT | 3 | CHE 107 \| CHE 107 - GENERAL COLLEGE CHEMISTRY II | 3 |
| CHE 105 \| CHE 105 - GENERAL COLLEGE CHEMISTRY I | 4 | CHE 113 \| CHE 113 - GENERAL CHEMISTRY II LABORATORY | 2 |
| CHE 111 \| CHE 111 - GENERAL CHEMISTRY I LABORATORY | 1 | ABT 120 \| ABT 120 - GENETICS AND SOCIETY | 3 |
| UK Core - Comp. & Comm. I | 3 | BIO 148 \| BIO 148 - INTRODUCTORY BIOLOGY I | 3 |
| MA 123 or MA 113 or MA 137 | 4 | BIO 155 \| BIO 155 - LABORATORY FOR INTRODUCTORY BIOLOGY I | 1 |

## Sophomore Year Credit Hours: 29 - 32

| FALL SEMESTER | 15 | SPRING SEMESTER | 14 - 17 |
|---|---|---|---|
| CHE 230 \| CHE 230 - ORGANIC CHEMISTRY I | 3 | CHE 232 \| CHE 232 - ORGANIC CHEMISTRY II | 3 |
| CHE 231 \| CHE 231 - ORGANIC CHEMISTRY LABORATORY I | 1 | CHE 233 \| CHE 233 - ORGANIC CHEMISTRY LABORATORY II | 1 |
| BIO 152 \| BIO 152 - PRINCIPLES OF BIOLOGY II | 3 | UK Core - Statistical Inferential Reason | 3 |
| ABT 201 \| ABT 201 - SCIENTIFIC METHOD IN BIOTECHNOLOGY | 1 | UK Core - Social Sciences | 3 |
| UK Core - Arts and Creativity | 3 | UK Core - Humanities | 3 |
| Elective | 4 | Elective | 1 - 4 |

## Junior Year Credit Hours: 32

| FALL SEMESTER | 16 | SPRING SEMESTER | 16 |
|---|---|---|---|
| PHY 211 \| PHY 211 - GENERAL PHYSICS | 5 | BCH 401G \| BCH 401G - FUNDAMENTALS OF BIOCHEMISTRY | 3 |
| ABT 360 \| ABT 360 - GENETICS | 3 | BIO 308 \| BIO 308 - GENERAL MICROBIOLOGY | 3 |
| ABT 301 \| ABT 301 - WRITING AND PRESENTATIONS IN THE LIFE SCIENCES | 2 | BIO 309 \| BIO 309 - MICROBIOLOGY LABORATORY | 2 |
| UK Core - Global Dynamics | 3 | PHY 213 \| PHY 213 - GENERAL PHYSICS | 5 |
| Specialty Support FA18+ | 3 | Specialty Support FA18+ | 3 |

## Senior Year Credit Hours: 27 - 33

| FALL SEMESTER | 12 - 18 | SPRING SEMESTER | 15 |
|---|---|---|---|
| ABT 495 \| ABT 495 - EXPERIMENTAL METHODS IN BIOTECHNOLOGY | 4 | ABT 460 \| ABT 460 - INTRODUCTION TO MOLECULAR GENETICS | 3 |
| ABT 395 \| ABT 395 - INDEPENDENT STUDY IN BIOTECHNOLOGY | 1 - 4 | ABT 461G \| ABT 461G - INTRODUCTION TO POPULATION GENETICS | 3 |
| Specialty Support FA18+ | 3 | Specialty Support FA18+ | 3 |
| Specialty Support FA18+ | 3 | Specialty Support FA18+ | 3 |
| Elective | 1 - 4 | Specialty Support FA18+ | 3 |

University of Kentucky is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award associate, baccalaureate, masters, and doctorate degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097, call 404-679-4500, or online at www.sacscoc.org for questions about the accreditation of University of Kentucky.

Current UK students: Please login to http://myUK.uky.edu to access your personalized major map and degree audit via the Graduation Planning System (GPS). This major map is the curriculum requirements for completion of the degree program only and is not a personalized audit based on your completed coursework. This major map does not reflect entrance requirements for selective majors. Please consult with the college to learn more about admission to this major.

**Course: ABT 101**
Title: **Introduction to Biotechnology**

Term: Fall
Credit hours: 1
Lecture: Wednesday 2:00-3:50pm, Seay Auditorium

## Instructor and Course Coordinator Information

Name: Dr. Robert (Lou) Hirsch
Department: Plant Pathology
Email: rlhi227@uky.edu
Office: 229 Plant Sciences Building
Phone: (859) 218-0790
Office hours: Please consult my availabilities at least 24 hours in advance for in person or virtual meetings through this link: https://calendly.com/lou_hirsch. Also, walk-ins welcome if I'm at my desk!

Name: Dr. Nick Teets
Department of Entomology
Email: n.teets@uky.edu
Office: 317 Plant Sciences Building
Phone: (859) 257-7459
Office hours: By appointment; walk-ins welcome if I'm at my desk!

Name: Dr. Kendall Corbin
Department of Horticulture
Email: krcorb3@uky.edu
Office: 407 Plant Sciences Building and 308F Agricultural Science Center North
Phone: (859) 562-0918
Office hours: By appointment; walk-ins welcome if I'm at my desk!

Name: Esther Fleming (Course Coordinator)
Academic Coordinator of the Agriculture and Medical Biotechnology Program
Email: efleming@uky.edu
Office: N212 J Agricultural Science Center North
Phone: (859) 257-3263
Office Hours: By appointment via myUK, or directly email for availability

## Course Description

An introduction to biotechnology: historical perspectives, current applications, and future directions. The course will consist of informal lectures and interactive discussions led by Biotechnology faculty and visiting professionals. The course will also orient students to the educational/career opportunities in Biotechnology and assist them in developing a focus for their individualized degree programs. Lecture, two hours per week.

## Course Prerequisites

Enrollment in the Ag. and Medical Biotechnology program

## Required Materials

None, all materials will be provided.

## Associated Expenses

None

## Activities Outside of Regular Class Meetings

None that are required. The ABT 101 students (in addition to all other members of our program) will be invited to participate in a low to moderate difficulty hike at the Berea Pinnacles (with free lunch) in September, and a tailgate party prior to a UK football game (date TBD).

## Skill and Technology Requirements

The course material will be available on Canvas. An internet-enabled computer with current MS Office (or equivalent) is required for the class. Also, students will be invited to use their smartphones or tablets in class during active learning exercises.

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## Student Learning Outcomes

After completing this course, students will be able to:

1. Develop an appreciation of the field of biotechnology including the underlying science, the organisms involved, and how scientists utilize biotechnology techniques to manipulate living organisms.
2. Develop a plan for their baccalaureate degree in biotechnology.
3. Explore the various career options in the field of biotechnology while developing a career plan.
4. Learn the steps to obtain hands-on research experience while at the University of Kentucky.
5. Experience the worldwide application of biotechnology.

## Course Details

***Tentative Course Schedule***

Blue font represents Esther's advising and career preparation topics
Green font represents group building activities
Red font represents the Biotechnology is Fun! Activity or Careers in Biotechnology Guest speaker

**Week 1 August 25—Welcome to ABT! Starting time for class is 2:05pm**

Esther (30 minutes): ABT program introduction
Dr. Hirsch (remainder): Course introduction, and student break-out sessions for introduction

**Week 2 September 1 – ABT faculty and staff introductions!**

Esther (30 minutes): Faculty and staff introductions
(Remainder): Meet and Greet with ABT faculty—location Seay Auditorium atrium.

**Week 3 September 8: The Science of Mental Contamination (Instructor: Dr. Hirsch)**

Esther: (~30 minutes) Developing 4 yr plan and developing yourself for your career, writing emails, how to use your degree audit, UK Core series, developing your niche.
Cohort building activity

Dr. Tom Adams, UK Department of Psychology, "The Law of Contagion"

**Week 4 September 15: Fungi Are Awesome (Instructor: Dr. Hirsch)** (first chemistry test September 16)

Esther: (10 minutes) Account holds, First year series
Cohort building activity
Dr. Lou Hirsch, UK Department of Plant Pathology, "Edible fungi are all around us"

**Week 5 September 22: Getting Ready for Graduate School (Instructor: Dr. Hirsch)**

Esther: (20 minutes) Announcements, Science series
Cohort building activity
Careers in Biotechnology panel: Graduate and Professional schools
**Optional (but encouraged) Saturday 9/25 Field Trip: Berea Pinnacles Hike (all ABT invited)**

**Week 6 September 29: Backyard Biology (Instructor: Dr. Teets)**

Esther: (15 minutes) Announcements, Biology series, Biotech series, Asking for help
Cohort building activity
Dr. Nick Teets, UK Department of Entomology, "What is in your backyard? Biodiversity on UK's Campus"

**Week 7 October 6: "Healthing" the World (Instructor: Dr. Corbin)**

Esther: (15 minutes) Announcements, Specialty support courses, 45 credit 300+ req
Cohort building activity
Craig Borie, Program Manager for Shoulder-to-Shoulder Global Program and Director of UK Peace Corps Preparation
Dr. Melody Ryan, Assistant Provost for Global Health Initiatives at UK.
https://international.uky.edu/GHI

**Week 8 October 13: FoodChain (Instructor: Dr. Corbin)** (second chemistry test October 14)

Esther: (10 minutes) Announcements
Cohort building activity
Alex Ball, Farm Operations Manager at FoodChain. https://foodchainlex.org/

**Week 9 October 20: The Food Connection and Wine Research (Instructor: Dr. Corbin)** (week 9 fall 2020 ppt)

Esther: (20 minutes) Announcements, Research Series
Cohort building activity
Due to space limitations at the Campus Kitchen, we will split the class into two groups for this class session, and on 11/3. Esther's material will be available via Echo360 recording on Canvas.
**Lemon drops** will meet at The Food Connection in the 90. Speaker: Tanya Whitehouse, Chef and Program Manager, The Food Connection. https://foodconnection.ca.uky.edu/
**Bluebirds** will meet at Seay Auditorium. Speakers: Dr. Jeff Wheeler, Extension Specialist in Enology and Head Winemaker at UK; Dr. Carlos Rodriguez Lopez, UK Department of Horticulture. https://winery.ca.uky.edu/

**Week 10 October 27: Fall Advising Session**

Esther: Mandatory IN CLASS Advising Session

Lemon drops: Attend the first hour of class from 2:00-2:50pm
Bluebirds: Attend the second hour of class from 3:00-3:50pm

**Week 11 November 3: The Food Connection and Wine Research (Instructor: Dr. Corbin)**

Esther: (10 minutes) Announcements, Brief review about registering for classes
Cohort building activity
Due to space limitations at the Campus Kitchen, we will split the class into two groups
**Lemon drops** will meet at Seay Auditorium. Speakers: Dr. Jeff Wheeler, Extension Specialist in Enology and Head Winemaker at UK; Dr. Carlos Rodriguez Lopez, UK Department of Horticulture. https://winery.ca.uky.edu/
**Bluebirds** will meet at The Food Connection in the 90. Speaker: Tanya Whitehouse, Chef and Program Manager, The Food Connection. https://foodconnection.ca.uky.edu/

**Week 12 November 10: Evidence-based Birth (Instructor: Dr. Teets)**

Esther: (20 minutes) Announcements, Your summer Internship, College scholarships
Your new normal
Cohort building activity
Rebecca Dekker, Founder and CEO of Evidence Based Birth.

**Week 13 November 17: Good Coffee (Instructor: Dr. Teets)** (third chemistry test November 18)

Esther: (10 minutes) Announcements
Cohort building activity
Dr. David Gonthier, UK Department of Entomology, "The science behind a good cup of coffee"

**Week 14 November 24 NO CLASS Thanksgiving break**

**Week 15 December 1: Chickens. Chickens Everywhere (Instructor: Dr. Teets)**

Esther: (10 minutes) Announcements
Cohort building activity
Laura Unfried, Ph.D. Student, UK Department of Entomology, "The Beauty of Chickens"

**Week 16 December 8: Last Day of Classes and Celebratory Feast**

Esther: (10 minutes) Announcements
Cohort building activity: ABT 101 end of the year Celebratory Feast

***Course Activities and Exams***

*Lectures/Discussions*

Attendance is required.

*Participation*

Electronic devices are not permitted in classes unless specifically part of an active learning experience, so please take any notes by hand in a notebook. Conducting non-ABT 101 activities on digital devices will result in a loss of participation credit for this course. Students may be called on to participate or be expected to work in groups for active learning sessions during every class.

*Reflections and other written products*

Brief reflection narratives, professional documents, and academic plans will be due throughout the semester.

*Distribution of Credit*

| | |
|---|---|
| Attendance | 60% |
| Participation | 20% |
| Reflections and other written products | 20% |
| **TOTAL** | **100%** |

### *Grading Scale*

A= 90-100
B= 80-89.9
C= 70-79.9
D= 60-69.9
E= <60

### *Midterm Grades*

*For undergraduates, midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar. (http://www.uky.edu/registrar/content/academic-calendar)*

### *Attendance Policy/Acceptable Documentation*

Attendance is required, and arrival to class more than 10 minutes late (without approval from the course instructor) is considered an absence. Each student will be granted one waiver.

## Assignment Policies

### *Assignment Submissions*

Assignments should be submitted through Canvas.

### *Returning Assignments to Students*

Assignments will be assessed and comments provided through Canvas, which is accessible by the student.

### *Late Assignments*

Late assignments will not be accepted unless qualified by documented excuses as outlined in the University Senate Rules (https://www.uky.edu/universitysenate/rules-regulations)]

### *Assignments Due during Prep Week*

Please consult the tentative course plan at the end of this document.

## Academic Policy Statements

Please consult the following webpage: Academic Policy Statements (https://www.uky.edu/universitysenate/acadpolicy)]

## Academic Offenses (Cheating, Plagiarism, and Falsification or Misuse of Academic Records)

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## Resources

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Distance Learning Library Services,
Tutoring and Coaching Resources
(https://libraries.uky.edu/page.php?lweb_id=1020,
https://www.uky.edu/studentacademicsupport/free-tutoring-and-coaching-resources)]

## Diversity, Equity, and Inclusion

Please consult the Senate Council-approved Syllabus Statement on Diversity, Equity, and Inclusion (DEI).
(https://www.uky.edu/universitysenate/syllabus-dei)]

## Student Resources

*The University offers a variety of resources to students. Visit the University Senate's Resources Available to Students to access that list (https://www.uky.edu/universitysenate/student-resources).*

## Classroom Behavior Policies

The student will only receive credit for attendance if it is accompanied by appropriate behavior. No credit for attendance will be earned if the student demonstrates disrespectful or disruptive behavior (talking in class, sleeping, noisy tardy arrivals, failing to turn off a cell phone, typing on their computer or tablet during non-active learning sessions, etc.). Texting is not permitted during class; violation of this policy will be treated as equivalent to absence from class.

Computers, tablets, and cell phones will not be allowed in class unless specifically requested as part of a class project. The reasons for not allowing digital media in the classroom are twofold: 1) Some students are tempted to browse social media or do other homework while in class, which tends to distract other students (especially those students with a clear view of the offender's computer screen), and is disrespectful to the educational endeavor, and 2) Numerous scientific studies have indicated that taking notes by hand increases knowledge retention.

## Course Recordings

The University of Kentucky Code of Student Conduct defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress.

Meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are available only through the Canvas shell for this course and are not to be copied, shared, or redistributed.

As addressed in the Code of Student Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. In anticipation of such cases, students may be asked to complete an "authorization of use" form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

## Course Copyright

# Course: ABT 120, -001, -002

Title: **Genetics and Society**

Term: Spring
Credit hours: 3
Lecture: Monday/Wednesday 11:00am-11:50am (Ag. Sci. North N24F)
Lab: Thursday 11:00am-12:50pm (Section 001), 2:00pm-3:50pm (Section 002; Garrigus 106)

## Instructor Information

**Instructor**
Name: Robert (Lou) Hirsch
Email: rlhi227@uky.edu
Office building and room number: Plant Science Building 229
Office phone: (859) 218-0790
Office hours: Please consult my availabilities at least 24 hours in advance for in person or virtual meetings through this link: https://calendly.com/lou_hirsch

**Teaching Assistant**
Name: Rachel Sneed
Email: Rachel.Sneed@uky.edu
Office building and room number: Plant Science Building 222
Office hours: By Appointment

## Course Description

This course is designed for science and non-science majors, giving students an understanding of how genetics influences and impacts our social fabric on a daily basis, and equips students with a sufficient understanding to participate in the policy debates that are impacting our lives. The course will introduce students to the basic concepts of genetics and introduce them to the modern methodologies of molecular genetics. The course will also educate students in the process of scientific discovery and empower students with the knowledge and critical thinking skills necessary to evaluate the present and future impact of genetics on society.

## Course Prerequisites

None

## Required Materials

None, all pedagogical materials will be provided on Canvas. Students are required to provide their own lab safety equipment, such as scubs/lab coat and eye protection.

## Associated Expenses

None

## Activities Outside of Regular Class Meetings

None

## Skill and Technology Requirements

The course material will be available on Canvas. An internet-enabled computer with current MS Office (or equivalent) is required for the class. Also, students will be invited to use their smartphones or tablets in class during active learning exercises.

*For technical/account help, students can contact Information Technology Services by phone 859-218-HELP (4357) and via the ITS Customer Services page. (https://www.uky.edu/its/customer-support-student-it-enablement/customer-services)*

## Student Learning Outcomes

After completing this course, students will be able to:

1. Students will master the basic concepts of genetics and gain practical experience in the methodologies used in establishing basic scientific principles.
2. Students will realize the process of scientific discovery in laboratory exercises.
3. Students will demonstrate the knowledge, writing, and critical thinking skills necessary to evaluate the present and future impact of genetics on society.

## Course Details

### *Tentative Course Schedule*

See the last pages of this document.

### *Course Activities and Assessments*

*Lectures/Discussions*

Attendance is required and participation is expected. Questions will be assigned for each reading activity, and students are expected to familiarize themselves with the material and contribute to class discussions. At the beginning of class, the instructor will randomly call on students to answer or discuss questions from the course material. Students are allowed to pass one time when a question is directed at them during class; an answer of "I don't know" is treated the same as a pass. After the pass has been used, the student will lose two points off the final grade for failing to provide an answer; answers that suggest a serious lack of preparation may also result in deductions.

*Laboratory*

Attendance is required. Students will lose 2.5% off the final grade for each unexcused absence (arrival more than 10 minutes late is considered "absence"); there are no waivers for missed laboratories. Laboratory sessions are a fundamental component of learning plant pathology, and key concepts from laboratory will be included in exams. As the semester progresses, you will see that these laboratories are based on a philosophy of inquiry-based instruction. Most of the laboratories will challenge you to exercise higher-order thinking; and in a few laboratories, you will be designing and conducting your own, unique experiments. Note that food and drinks are not allowed in the laboratory, and even food wrappers, soda cans, water bottles, food residue, etc., can result in a fine. These regulations are out of my control and must be followed.

**50% Weekly Written Assignments:**

Throughout the semester you will be assigned short writing assignments that either address topics covered in lecture or components of scientific laboratory reports. The specific expectations and scoring sheets for each writing assignment will be assigned one week before the due date, and assignments will be due on Canvas. No late assignments are accepted without an excuse, even if submitted one minute past the deadline. Brief questions associated with labs are due at the end of the laboratory period.

**15% Lecture and Laboratory Questions**

Prior to many lectures/discussions, student will be accountable for the content in the form of submitting answers to guided reading/listening/viewing questions. Furthermore, some laboratory sessions are accompanied by content introduction videos with summary questions, and critical thinking questions which the students are expected to complete. The lecture material will be due on Canvas before each class session, and the laboratory questions will be due before the laboratory session. No late assignments are accepted without an excuse, even if submitted one minute past the deadline.

**25% Final Lab Report:**

Students are responsible for writing a laboratory report for the three-section PCR laboratory module. This assignment will contain all the individual sections that were covered in previously assigned weekly writing assignments in a single, comprehensive laboratory report. No late assignments are accepted without an excuse, even if submitted one minute past the deadline.

**10% Final Paper:**

The final paper will be an 800-word summary of a current topic in Agricultural and Medical Biotechnology, with an objective explanation of the arguments for and against aspects of the topic. The assignment scoring sheet will be handed out after spring break, but students are encouraged to identify their topics early in the semester so they can find adequate references and familiarize themselves with the various arguments. No late assignments are accepted without an excuse, even if submitted one minute past the deadline.

*Distribution of Credit*

| | |
|---|---|
| Weekly Writing Assignments | 50% |
| Lecture and Laboratory Questions | 15% |
| Final Lab Report | 25% |
| Final Paper | 10% |
| **TOTAL** | **100%** |

### *Grading Scale*

A= 90-100
B= 80-89.99
C= 70-79.99
D= 60-69.99
E= <60

### *Midterm Grades*

*For undergraduates, midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar. (http://www.uky.edu/registrar/content/academic-calendar)*

### *Attendance Policy/Acceptable Documentation*

Attendance is required. Students will lose 2% off the final grade for each unexcused absence (arrival more than 10 minutes late is considered "absence"); each student will be granted one waiver.

## Assignment Policies

### *Assignment Submissions*

Written assignments will be due through Canvas at a specific time and date (unless previously noted). Unexcused late submissions will not be accepted, even if submitted one minute past the deadline. If Canvas is down or if the student experiences technical difficulties, email submissions are acceptable (and encouraged if there is any question about Canvas' functionality). Furthermore, only the last submission will be assessed, so please feel free to submit incomplete drafts early in anticipation of technical difficulties. If you believe that you submitted your assignment on time but I have not received it, please take a screen capture image of your submission ticket on Canvas and send that to me via email as evidence of submission.

***Returning Assignments to Students***

All assignments will be assessed through Canvas via rubrics or scoring sheets that I will provide.

***Late Assignments***

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As addressed in the Code of Student Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

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Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

## Course Copyright

| Day | Topic | Assignment due 11:59PM Sunday (unless noted) |
|---|---|---|
| M 1/10 | Course introduction | |
| W 1/12 | How do science and society collide? | |
| Thurs 1/13 | **Introduction to the course, common laboratory practices, scientific writing strategies** | **Test of Canvas Submission** |
| M 1/17 | MLK Day, NO CLASS | |
| W 1/19 | Logical Fallacies | |
| Thurs 1/20 | **Crude DNA Extraction** | **Bias in the Media** |
| M 1/24 | How data are commonly misrepresented | |
| W 1/26 | Information literacy and how we are easily exploited | |
| Thurs 1/27 | **Learning how to read scientific literature** | **Lab report: Methods (DNA Extraction)** |
| M 1/31 | What is DNA | |
| W 2/2 | What is DNA and how are genomes organized? | |
| Thurs 2/3 | **Onion Mitosis I** | **Introduction to Scientific Literature** |
| M 2/7 | Heritability | |
| M 2/9 | The molecular genetics of disease | |
| Thurs 2/10 | **ELISA** | **Heritable trait assignment** |
| M 2/14 | Common Genetic Diseases | |
| W 2/16 | Epigenetics | |
| Thurs 2/17 | **The Microbes Around Us** | **Lab report: Introduction (ELISA)** |
| M 2/21 | Microbiomes in Animals and Plants | |

| | | |
|---|---|---|
| W 2/23 | Symbioses | |
| Thurs 2/24 | **Potato Soft Rot I** | **Lab Report: Discussion (Microbes around us)** |
| M 2/28 | Plant Pathology | |
| W 3/2 | Why fungi are awesome! | |
| Thurs 3/3 | **Potato Soft Rot II** | **ABT CV Project** |
| M 3/7 | The process of GE | |
| W 3/9 | Arguments for/against | |
| Thurs 3/10 | **PCR I** | **No assignment due (but consider submitting the Results section before you leave for Spring Break)** |
| M 3/14 | Spring Break | |
| W 3/16 | Spring Break | |
| Thurs 3/17 | Spring Break | **Lab Report: Results (Potato Soft Rot)** |
| M 3/21 | The products of GE organisms | |
| W 3/23 | Arguments for/against | |
| Thurs 3/24 | **PCR II** | **No assignment** |
| M 3/28 | CRISPR-Cas9 | |
| W 3/30 | Arguments for/against | |
| Thurs 3/31 | **PCR III** | **Ethical Concerns with GE Organisms** |
| M 4/4 | Gene Intellectual Property Rights | |
| W 4/6 | Arguments for/against | |
| Thurs 4/7 | **Bioinformatics 101** | **No assignment** |
| M 4/11 | Genetic Testing for Disease | |
| W 4/13 | Arguments for/against | |
| Thurs 4/14 | **Enzyme Function and Measurement** | **Final Lab Report Due** |
| M 4/18 | The Science of Addiction | |
| W 4/20 | Discussion: Ask a Psychologist | |
| Thurs 4/21 | **Fermentation** | **Redemption Assignment** |
| M 4/25 | The Law and Science | |
| W 4/27 | Discussion: Ask a Lawyer | |
| Monday 5/4 | **Final exam period** | **Final Written Assignment Due at 12:30pm (EST) on 5/4** |
| | | |

# Course: ABT 201-001
## Title: Scientific Method in Biotechnology

Term: Fall 2021
Credit hours: 1
Meeting days/time/location: Thursday 4:00-4:50, room B52 Garrigus Bldg.

### Instructor Information

Name: Dr. Sharyn Perry
Email: sperr2@uky.edu
Office building and room number: Plant Science Building, room 307
Office phone: (859)-218-0732
Office hours: by appointment. Please call or email me to set up an appointment.

### Course Description

***Overview***

This course introduces scientific research, writing and presentations emphasizing agricultural and medical biotechnology and related areas.

***Description***

A course designed to acquaint students with common experimental methods and techniques used in biotechnology. Students will be exposed to research programs that embody basic scientific reasoning, experimental strategies, the role biotechnology plays in society, and careers in biotechnology and science in general. Presentations will be delivered by individuals recognized for their scientific endeavors as well as in some cases the role they have played as research mentors for ABT students.

Students will use a collection of objective evaluation tools to assess the relative merits of individual programs as exemplified by publications, competitive funding, and societal contributions. Each student will be required to provide one written evaluation using the aforementioned tools. In addition this course meets part of the University's upper division writing requirement (ABT 201 and ABT 301 together meet the upper division writing or composition/communication requirement, GCCR). A detailed description of the writing requirement is below. The class will provide the student with the basic skills needed for objective evaluation of research programs that might be of interest to them as an environment for completion of their ABT 395/399 requirement. It also introduces by example and assignment the scientific writing and presentation skills that are essential for success in the discipline.

### Course Prerequisites

This is a writing-intensive course approved to partially fulfill the upper tier of the graduation writing requirement (GCCR). To receive GCCR credit for this course, you must have successfully completed the first-year writing requirement (CIS/WRD 110 and 111 or their equivalent) and have completed at least 30 hours of coursework. Please contact me if you have any questions.

### Required Materials

none

## Associated Expenses

none

## Activities Outside of Regular Class Meetings

none

## Skill and Technology Requirements

Ability to access databases such as PubMed, Web of Science, and Journal Citation Reports as well as some granting agency databases. All are free for public use or available for free through UK.
*For technical/account help, students can contact Information Technology Services by phone 859-218-HELP (4357) and via the ITS Customer Services page. (https://www.uky.edu/its/customer-support-student-it-enablement/customer-services)*

## Student Learning Outcomes

1. Write a paper that is essentially free of mechanical errors (grammar, punctuation, spelling, and syntax) and awkwardness, using a style that is appropriate to the purpose and audience.
2. Demonstrate an ability to discover, evaluate, and clearly present evidence in support of an argument in the subject area and utilize documentation that conforms to the formats and the citation conventions of the subject area.
3. Be aware that composing a successful text frequently takes multiple drafts, with varying degrees of focus on generating, revising, editing, and proofreading.
4. Write a capable, interesting essay about a complex issue (discipline-specific) for a general university audience.

## Course Details

### *Tentative Course Schedule*

Please see the Canvas site for the course to access the schedule of presenters and topics.
August 26 – Dr. S. Perry, Course mechanics.
September 2 – Dr. S. Perry, Databases and objective evaluation measures of research.
September 9- Dr. Nick Teets, Dept. of Entomology, "Entomology from Kentucky to Antarctica: How do insects deal with extreme heat and cold?"
September 16 – Dr. Hanna Poffenbarger, Dept. of Plant and Soil Sciences, "Understanding and managing soil variability in agroecosystems." https://poffenbargerlab.weebly.com/
September 23 – Layne Harris
September 30 – Dr. John Littleton and Kristen Bruce (ABT alum), "Research at Naprogenix: Natural Product Genomics" http://www.naprogenix.com/about_us.asp
October 7 – Dr. Tim McClintock
October 14 – Dr. Tomokazu Kawashima, Department of Plant and Soil Sciences, "A new approach to identify genes required to make a seed", http://kawashimalab.ca.uky.edu/
October 21 – Dr. David Mannino
October 28 – Dr. Rebecca Dutch, Department of Molecular and Cellular Biochemistry, "Research at UK on COVID-19", https://biochemistry.med.uky.edu/users/rdutc2#profileTab1
November 4 – Rachel Potter
November 11 – Dr. Sheng Tong, Dept. of Biomedical Engineering, "Application of genome editing in disease treatment"
November 18 – MIXER!!!!
Novermber 25 – Thanksgiving!
December 2 – Dr. David VanSanford
December 9 – NO MEETING – Reading day – good luck on the finals!

### *Course Activities and Exams*

There are no exams in this course. Please see below under Grading for a description of required activities for the course along with deadlines.

### *Grading*

| | | |
|---|---|---|
| Attendance | 10 points | (10%) |
| Class participation | 10 points | (10%) |
| CV Assignment | 5 points | (5%) |
| Critique of presentation | 10 points | (10%) |
| Paper topic/justification/citations | 10 points | (10%) |
| Paper draft | 20 points | (20%) |
| Written report (25) and peer review (10) | 35 points | (35%) |
| **Total** | **100 points** | **(100%)** |

Letter grades will be based on the percentage of total points earned.

| | |
|---|---|
| A | 89.5-100% |
| B | 79.5-89.4% |
| C | 69.5-79.4% |
| D | 59.5-69.4% |
| E | <59.5% |

*Class Attendance (10 pts):* Success in college and at work requires consistent and reliable effort. I place great emphasis on identifying speakers representing a range of subject areas and material. To understand the biotechnology field you require this breadth of experience. Therefore, I expect attendance and class participation**. One unexcused absence is allowed. An unexcused absence will cost 5 points op to 10 pts total.** There is no penalty if you have an acceptable excuse for absence. If you know you will be absent, please let me know ahead of time. Attendance will be recorded by you signing in each meeting. It is your responsibility to sign the attendance sheet. Hand sanitizer will be available for you should you not have your own pen.

*Class participation (10 pts):* Class participation points will be awarded by you asking questions of the speakers. You will need to ask at least three questions during the semester and can only get credit for one question per speaker (thus, you need to ask at least one question of three different speakers – Of course you can ask more!). There are "assignments" called "participation 1, 2, and 3" in Canvas – each is worth 3.33 pts. When you ask a question, submit "done" and I will credit the points.

*CV assignment (5 pts):* Each student is required to submit their CV following the standard format with provided categories. An example is provided in a separate file available on Canvas (ABT CV project, Fall 2020). The CV is due **September 23rd 2021.**

*Critique of presentations (10pts):* Each student is required to evaluate one speaker presentation. The evaluation should include a brief synopsis of the research interests of the speaker and an evaluation of productivity and quality of the research program. You will need to do some background review of the speaker and will be directed to tools to accomplish this task. You will also be provided with a sample review. **This is due by December 2nd, but if you submit by November 18th** I will get back to you if there are any problems. An example is provided in a separate file available on Canvas (evaluation of research productivity).

*Writing assignment and peer review (topic/justification/citations – 10 pts; draft – 20 pts; peer review – 10 pts; final paper – 25 pts):*
In this course, students will be required to write a minimum 1500 words (excluding references) of formal writing that is drafted, peer reviewed, and revised before grading by the instructor (**minimum of 1500 words is REQUIRED excluding references– word count should be listed on the first page**). An additional page may be used for references and should **NOT** be included in the word count. **A minimum of five (5) references from the peer reviewed literature are required for the final paper.** Double space, one inch margins and maximum size 12 point font, Times New Roman are acceptable. If you have questions about your topic, please contact the instructor. Your paper topic, one to two sentences explaining the significance of the topic, and three (of the five required) relevant citations formatted correctly are due to Dr. Perry by **October 7th**. The formal paper, along with the one-page written evaluation of one of the speaker's research program, will fulfill the writing requirement for ABT201. The formal paper for ABT201 may focus on one of the research presentations, or may address other current issues or research questions in science. Statements must be appropriately documented by references from the literature. **Web references should not be used.** Please note: ABT301 must also be completed to fulfill the GCCR.

***Draft-and-review process:***
Writing and revision of drafts is essential to effective composition and scientific writing. Scientific writing also differs from some other styles of composition in that it contains highly technical language with scientists placing great emphasis on precise, clear and concise writing. In order to be successful at effective writing, you will need to write and revise your draft yourself, before giving it to your reviewer. You want to provide your reviewer with a well-written cohesive document on which they can provide further suggestions. You will be assigned a classmate as your peer reviewer and will be provided with contact information through Canvas. I would like you to use the online tools in Canvas to edit and comment on the draft paper.

When you submit your paper on Canvas, please name the draft as: **Author name_draft.** Please name the edited files as **Author name_reviewer name.** Please name the final revised paper as: **Author name_FINAL.**
What should you cover in your paper?

You may discuss any scientific issue or research area of interest to you in your paper. You may also choose to write on one of the faculty that present a seminar about their research program. If you choose the later, your paper should provide a biography on the presenter (not more than one of the five pages) and a synopsis of the research program including a discussion about why the research is important. Please include your opinion on possible future directions for the research, and/or comment on a project that you would like to pursue in the presenter's lab. Regardless of whether you write about a presenter's program or on another scientific issue of interest to you, please remember that your paper should be written for a general university audience and should demonstrate an ability to clearly present and evaluate evidence. Also important is a discussion about why the research area is important (why should funding agencies give you taxpayer money for the research?).

**Writing assignment schedule:**

**October 7th, 2021–** topic, significance of the topic, and three relevant references due to Dr. Perry (an example is available as a file in Canvas – "Example of topic sig and refs".

**October 7th to October 28th , 2021**– write and revise your draft. Please start early. Do NOT wait until the last week! I would suggest to have a first draft for your **own** review by Oct. 20th at the latest. That will allow you a week to revisit and revise your work so that you are providing your peer reviewer with a polished manuscript on Oct. 28th!

**October 28th, 2021** – deadline for draft version. Please submit your draft via Canvas by midnight of this day.

**November 11th, 2021** – comments on drafts are due. Return the document with comments and changes tracked to the author by this date. Do this by submitting via Canvas.

**December 2nd, 2021**– the final paper must be submitted via Canvas by midnight on this date.

Please submit all assignments via Canvas.

**GRADING POLICIES:**
To pass the course, you must submit all formal assignments (in draft and final form) and earn a grade of C or higher on each. Assignments other than the formal writing enter into the final grade determination *only if you have achieved grades of C or higher on graded assignments.* Any major assignment that receives a D or below must be revised to reflect competency and resubmitted. You may resubmit such assignments 2 times. If you fail to achieve a C grade on the final version of any major writing assignment, you will receive a failing grade for the course.

At the discretion of the instructor, students who fail to achieve competency may receive I (incomplete) grades, but in no case may a student whose writing fails to reach the level of C (competent) receive a passing grade in a course that satisfies the University Writing Requirement.

***PLAGIARISM***
Part II of *Student Rights and Responsibilities* (6.3.1; online at http://www.uky.edu/StudentAffairs/Code/part2.html) 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 anything else from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work, whether it is a published article, chapter of a book, a paper from a friend or some file, or whatever. 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.

### *Midterm Grades*

*For undergraduates, midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar. (http://www.uky.edu/registrar/content/academic-calendar)*

### *Attendance Policy/Acceptable Documentation*

Please see above, "Attendance" for the policy. Allowable excused absences are detailed at https://www.uky.edu/universitysenate/acadpolicy#Excused

## Assignment Policies

### *Assignment Submissions*

Please submit all written assignments via Canvas. If you have any problems, please email me.

### *Returning Assignments to Students*

All comments on assignments will be available in Canvas. While I will provide brief comments on the draft, most comments should be from your peer reviewer. I will not comment in detail on the final paper, but should you have questions or desire more feedback, please contact me.

### *Late Assignments*

I will consider good reasons to request short extensions on assignments. However, if you submit assignments late, without first contacting me, you should expect a reduction of grade at the rate of 5% per day that the assignment is late. Per the University Senate Rules, within some guidelines late assignments must always be accepted for excused absences. (https://www.uky.edu/universitysenate/rules-regulations).

### *Assignments Due during Prep Week*

none

## Academic Policy Statements

Please see the Senate's Academic Policy Statements, https://www.uky.edu/universitysenate/acadpolicy

## Academic Offenses (Cheating, Plagiarism, and Falsification or Misuse of Academic Records)

Please refer to Rules Regarding Academic Offenses, https://www.uky.edu/universitysenate/ao

## Resources

University of Kentucky home page: http://www.uky.edu/

RePORTER (NIH): http://projectreporter.nih.gov/reporter.cfm

NSF: http://www.nsf.gov/awardsearch/

CRIS: https://cris.nifa.usda.gov/

ISI Web of Knowledge:
Go to UK libraries: http://libraries.uky.edu/; click database tab; click "W"; select "web of science" or "J" for Journal Citation Reports. At some point you will have to log in with UK ID and password.

Pubmed.gov: https://pubmed.ncbi.nlm.nih.gov/

Ag. Biotech home page: http://abt.ca.uky.edu/

The Robert E. Hemenway Writing Center: https://wrd.as.uky.edu/writing-center

## Diversity, Equity, and Inclusion

*The University of Kentucky is committed to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community (Governing Regulations XIV). We acknowledge and respect the seen and unseen diverse identities and experiences of all members of the university community (https://www.uky.edu/regs/gr14). These identities include but are not limited to those based on race, ethnicity, gender identity and expressions, ideas and perspectives, religious and cultural beliefs, sexual orientation, national origin, age, ability, and socioeconomic status. We are committed to equity and justice and providing a learning and engaging community in which every member is engaged, heard, and valued.*

*We strive to rectify and change behavior that is inconsistent with our principles and commitment to creating a safe, equitable, and anti-racist environment. If students encounter such behavior in a course, they are encouraged to speak with the instructor of record or the college's diversity officer, who is charged with addressing concerns about diversity, equity, and inclusiveness (uky.edu/inclusiveexcellence/college-diversity-inclusion-officers). Students may also contact a faculty member within the department, program director, the director of undergraduate or graduate studies, the department chair, or the dean. To submit an official report of bias, hatred, racism, or identity-based violence, visit the Bias Incident Support Services website (https://www.uky.edu/biss/report-bias-incident).*

## Student Resources

*The University offers a variety of resources to students. Visit the University Senate's Resources Available to Students to access that list (https://www.uky.edu/universitysenate/student-resources).*

## Classroom Behavior Policies

**Cell phones and texting/e-mail in class:**

Please remember to turn your cell phone **to silent mode** while in class. Please do **NOT** send or read text or e-mail messages while in class, or read the newspaper, do other homework, surf the Internet or listen to

music. We have many guest speakers who are very enthusiastic to visit with you and these types of activities would be disrespectful to the speaker and would distract from their lectures and your participation.

## Course Recordings

The University of Kentucky Code of Student Conduct defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress.

Meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are available only through the Canvas shell for this course and are not to be copied, shared, or redistributed.

As addressed in the Code of Student Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. In anticipation of such cases, students may be asked to complete an "authorization of use" form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

## Course Copyright

# Course: ABT 301-001
# WRITING AND PRESENTATION IN THE LIFE SCIENCES

Term: Spring 2022
Credit hours: 2
Meeting days/time/location: MW 9:00 – 9:50 am, Ag. Science Bldg. North, A-06

## Instructor Information

Name: Dr. Olga Tsyusko
Email: olga.tsyusko@uky.edu
Office building and room number: Ag Science Bldg. North, Room N-122Q
Office phone: (859) 257-1777
Office hours: By appointment. Meetings can be conducted either *in person* (safety permitting) or by *Zoom at https://uky.zoom.us/j/8592571777*

## Course Description

This class is intended to refine skills in communicating and evaluating science-based knowledge. Specific focus is given to the agricultural, biological, and bio-medical sciences. One major goal is to facilitate the writing of an Agricultural and Medical Biotechnology Independent Research Proposal. In the process, students will learn how to evaluate relevant literature, think about science and the scientific process, and communicate scientific results and implications. This course should further the students' experience with science, enhance their appreciation for the scientific process, and what it means to conduct scientific research. The specific goals for students are:

- Asking and addressing the questions, "What is 'science'?" and "What is involved in planning a scientific investigation?";
- Reading and evaluating the science of others, with specific reference to the skills needed to communicate experimental design, results and data interpretation;
- Orally presenting scientific research methods and results;
- Writing a research proposal and learning how to write effective scientific reports and papers.

## Course Prerequisites

*ABT 301 is specifically intended for ABT students who are either already actively engaged in research in a lab or are in the process of formulating a research project with their mentor.* **Much of the course is structured around the preparation and presentation of a formal research proposal, so it is essential that all students have a faculty research mentor BEFORE class commences or within the first two weeks of the class. Your first assignment will be due in two weeks of the class providing your project title and signed by your mentor in whose lab you will be doing your research.**

***It is the responsibility of each student to identify a research mentor and a research project. If you have not already identified a mentor, you need to do it within the first two weeks of the class. If you need help to find a mentor, please ask me or contact Esther Fleming, who is an ABT academic coordinator, or you will need to drop this course!***

## Recommended Textbook

There is a Textbook pertaining to aspects of this course should you wish to read more on this topic: Pechenik, J. A. (2007). A short guide to writing about biology. New York, Addison-Wesley Educational Publishers, Ltd. (6th edition). It is NOT a requirement that you do so.

## Technology Requirements

I will ask you to bring your laptops to some of the class meetings.

## Student Learning Outcomes

Upon completion of this course, students will have:

- Been exposed to and discussed the general aspects of scientific inquiry.
- Demonstrated an ability to acquire and evaluate scientific literature (especially primary literature) that is relevant to their specific field of interest.
- Orally presented a 20-minute presentation that provides relevant background information and describes their proposed research project.
- Written draft and final versions of a formal research project proposal that fulfills one of the requirements for ABT 395 or ABT 399.

*Description of the learning outcomes pertaining to the upper division-writing requirement is provided below.*

## Course Activities

One of the requirements to obtain an Agricultural Biotechnology degree is the successful completion of an independent research project (through either ABT 395 or ABT 399).

The main activities will include: (i) devising a research project proposal in cooperation with a research mentor; (ii) writing and presenting the research proposal; (iii) critiquing oral presentations of fellow students and scientists; and (iv) reviewing the proposed projects of other students.

This course partially fulfills the University's upper division composition and communication requirement (ABT 201 and ABT 301). *A detailed description of the communication requirement is found at the end of this document.*

## Grading Scheme and Assignments

Grades will be based on assignments, class attendance, and participation. A summary listing of Due Dates for individual assignments is provided in the ABT 301 Calendar. Note that these due dates are subject to revision and that additional assignments and dates may be announced during class. All assignments, whether submitted as hard copy or electronic documents, must be available to the instructor by the due date and time. There are penalties for late submissions (see Policies section).

*Note that failure to submit the "Final Proposal Draft" on time will result in automatic failure of the course.* This is a consequence of the fact that the course partially fulfills the upper division composition and communication requirement (see below).

Note that most written assignments will be submitted electronically as specified by the instructor. Some assignments may require simple e-mail message submissions while others will require documents prepared using Microsoft Word and submitted via Canvas. **For MS-Word documents, use 1-inch margin on all sides, 1.5- or 2-line spacing (unless otherwise indicated), 12-point font size, and a header on all pages showing page number (centered) and student's name (right hand corner).** Late submissions will be penalized as outlined in the "Policies" section.

**Assignments:**

1. Proposal title; mentor's information, *sub-total: 3 points*
   - A descriptive and focused proposal title (even if tentative) must be provided.
   - Your research mentor's name, department, and e-mail address must be provided. All of this information must be submitted as a single MS-Word file.

2. Assignments based on Question Set #1, *sub-total: 5 points*
   - Note that unless otherwise stated, complete sentences must be provided.
   - Unless otherwise stated, submissions must be as MS-Word files.

3. Library Resource Exercise (Question Set #2), *sub-total: 10 points*
   - Potential search terms must be submitted prior to the deadline announced in class.
   - The database exercise must be completed and submitted electronically via Canvas prior to the deadline announced in class.
   - Literature citations relevant to the proposed project must be provided.
   - Citations (five in total) must be from the primary scientific literature.
   - Citations must come from at least three different scientific journals.
   - Use a standard citation format that includes all authors, year of publication, full article title, journal name, journal volume, and inclusive page numbers. You will be graded on the accuracy with which you follow the format style.

4. CV Assignment (work on your CV to fill in required categories), *sub-total: 5 points*

- For the ABT CV Project, you will not be assessed on your accomplishments, but rather the presentation, consistent formatting, and updated status of your document.
- Students are expected to build upon their past CV versions from previous classes and incorporate their instructor's feedback. Students should update their CV frequently on their own.
- If you do not have any contributions in a section, do not include that empty section in your submission for class. But, remember to add new sections to reflect novel contributions as you move through your career.
- In the CV assignment, you will find the example CV with commentary, which explains some of the sections in greater detail. Please remember that these section headers and formatting styles are suggestions, but you are encouraged to follow them. If you want to change the formatting, it is prudent to keep education at the top, but the sections can be moved around. What matters most is that your document clearly outlines your accomplishments and that your formatting is consistent.

5. Outside Seminar Critique, *sub-total: 4 points*
   - Each student must attend a professional seminar on campus and submit a written critique of the seminar.
   - The critique must include the date, time, location, speaker and topic, what was good and what was not good about the presentation style, organization, and use of visual or audio aids (maximum, 2 pp. submitted as an MS-Word file).

6. Presentations, *sub-total: 20 points* (10 points for practice and 10 points for formal)
   - Each student will make two oral presentations to the class of their research proposal, one practice presentation and one formal presentation.
   - A practice presentation will be scheduled by the instructor. Students are welcome to invite their research mentor to the practice presentation. Students are *required* to schedule a meeting with the instructor after the practice session to review performance and slides.
   - The presentation is to be done using PowerPoint
   - **The PowerPoint file for the draft (practice) presentation must be provided to the instructor at least 24 hours prior to the practice session.** This can be submitted via Canvas or by sending the file as an e-mail attachment. This file will assist the instructor in providing constructive comments about the presentation. *In addition, the student should bring a copy of the file on a USB flash drive on the day of the presentation.*
   - The PowerPoint file for the actual (formal) presentation must be provided to the instructor at least 24 hours prior to the scheduled presentation. This can be accomplished by submission via Canvas or sending the file as an e-mail attachment. This file will assist the instructor in providing constructive comments about the presentation. *In addition, the student should bring a copy of the file on an USB flash drive to class on the day of the presentation.*

7. Three questions based on students' formal presentations, *3 points* total

- Each student must provide a list of three questions pertaining to the presentation or ensuing discussion. The questions must be specific to the presentation. If the same question could be posed for multiple presentations (that is, if it appears generic), it will not be given credit. It will be acceptable for the lists of questions to include those raised by other students or the instructor during the presentation or ensuing question period.
- Students scheduled to serve as peer evaluators need not submit questions at the end of the presentations.
- Due in writing immediately following each formal presentation session.

*8.* Peer evaluation of practice (*5 points*) and formal (*5 points*) presentations, *10 points*

- The practice and formal presentations of each student will receive comprehensive peer evaluations by two fellow students. Overall, every student in the class will critique two practice and the same two formal presentations in total. The evaluators must attend both the practice and formal presentations of the students they will be evaluating.
- Evaluations are due electronically *within 48 hours* following the presentations and must follow the format provided in the Critiques for the Presentations.
- The evaluation of the practice presentation should focus on the specific strengths and weaknesses of the presentation.
- The evaluation of the formal presentation should focus on the relative improvement over the practice presentation. *The improvement and level of effort made in revising practice slides is an important consideration.*
- Peer evaluations will not be used to assign a grade for the presentation, so be completely honest and critical, but in a constructive way.
- Peer evaluations will be graded on their thoroughness. Student evaluations should not be so general and vague that they are of little value to the presenter; they should make specific comments and recommendations.

9. Research Proposal, 25 points* (*Draft = 10 points and Final Proposal = 15 points).*

- Each student will write a research proposal outlining the project they plan to conduct for ABT 395/399.
- The proposal must be prepared using the prescribed format. This format is acceptable for eventual submission of the proposal to the ABT program in partial fulfillment of ABT 395 or 399 requirements.
- Each student will submit via Canvas first draft of the proposal on the due date. The instructor will distribute copies to the two fellow students for peer review. The instructor will also provide a written review. Draft proposals should then be revised based on the review comments received from the instructor and the peer reviewers and incorporated into the final research proposal.
- The final version of the research proposal is due electronically via Canvas by the date noted in the ABT 301 Calendar

***Note that failure to submit the "Final Proposal Draft" on time will result in an automatic failure of the course.*** This is a consequence of the fact that the course partially fulfills the upper division-writing requirement (see below).

10. Peer reviews of ABT draft proposals, *10 points (5 points per proposal)*

- Peer review format and criteria will be distributed with the draft proposals. All reviews are to be submitted to the instructor so that they can be made available to the author by two weeks before the due date for the final draft.
- Reviews should be constructive in nature.

11. Participation in the class (discussion and attendance), *sub-total: 5 points*
    - Participation in class discussions is expected.
    - The class attendance is critical for success in this and other graded parts in this course. Attendance will be taken

**Total: 100 possible points**

**Four bonus points:** 3 points for attending at least three ABT 395 presentations and 1 point for asking question(s).

The end goal of the course is to provide the student with a clear and comprehensive research proposal to act as a guide while pursuing their research project. The results obtained, and conclusions drawn from them, are presented by you at a later semester in your ABT program in a formal presentation as part of ABT 395. It would be prudent to attend the upcoming ABT 395 presentations at the end of this semester (**TBD**) to see how they are arranged and what you should expect when it is your turn to present your work.

## Grading Scale

90% and above = A
80% to 89% = B
70% to 79% = C
60% to 69% = D
59% and below = E

***Note that failure to submit the "Final Proposal Draft" on time will result in an automatic failure of the course.*** This is a consequence of the fact that the course partially fulfills the upper division-writing requirement (see below).

If you believe that your assignment was graded erroneously—or if you discover that a mistake was made adding the total points—it is your responsibility to bring this to my attention within one week of the assignment due date, quiz, or report. In reasonable cases, I will be willing to re-grade assignments, quizzes, or exams under these circumstances. Note, however, that I reserve

the right to re-grade the entire assignment, quiz, or report. This may result in the final score being the same, higher, or even lower.

### *Midterm Grades*

Midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar. (http://www.uky.edu/registrar/content/academic-calendar)

## Attendance Policy/Acceptable Documentation

**Absences**: Attendance is mandatory and will be monitored. Since an important component of this class is active participation and observation of presentations, class attendance is essential to success in the course. Policies for excused absences are those of the University. Students are expected to abide by the student code of conduct as described by the office of student affairs (http://www.uky.edu/StudentAffairs/Code/). Unexcused absences will result in a 2% deduction. If you know ahead of time that you will be missing a class period, I strongly encourage you to notify me prior to the day of the class.

**Disability**: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (725 Rose Street, Suite 407, 859-257-2754, e-mail address: dtbeac1@uky.edu) for coordination of campus disability services available to students with disabilities.

## Assignment Policies

### *Assignment Submissions*

Assignments should be submitted through Canvas.

### *Returning Assignments to Students*

The assignments will be returned to students via Canvas within one week or earlier.

### *Late Assignments*

Late submissions of the "Final Proposal Draft" will *not be* accepted. ***Note that failure to submit the "Final Proposal Draft" on time will result in an automatic failure of the course***. This is a consequence of the fact that the course partially fulfills the upper division-writing requirement (see below).

Late submissions for other assignments will result in a loss per each day late of 5% of that assignment's maximum possible grade. Assignments will be due at times specified by the instructor. *It is strongly suggested that electronic submissions be made at least several hours before the formal assignment deadline.*

Per the University Senate Rules, late assignments will be accepted for excused absences. (https://www.uky.edu/universitysenate/rules-regulations)]

### *Assignments Due during Prep Week*

No assignments will be due during the prep week.

## Academic Policy Statements

You are required to follow requirements of the official policies established in the *University Senate Rules* (https://www.uky.edu/universitysenate/acadpolicy)

## Academic Offenses (Cheating, Plagiarism, and Falsification or Misuse of Academic Records)

**Academic Honesty**

It is your responsibility to familiarize yourself with the definitions of and sanctions for cheating and plagiarism at the University of Kentucky. Information on plagiarism at the University of Kentucky can be found at the following site: http://www.uky.edu/Ombud/Plagiarism.pdf. Rules governing cheating and plagiarism are in accord with Section VI of the code of student conduct (http://www.uky.edu/StudentAffairs/Code/part2.html).

The minimum penalty for an academic offense, such as cheating or plagiarism, is a "0" on the assignment. Repeated offenses will result in more serious penalties. Students should be aware that failure of the course, suspension and dismissal from the University are also possible sanctions associated with either of these academic offenses. Your submissions will be **automatically scanned** by TurnItIn software, integrated into Canvas, for obvious breaches and your instructor alerted to them.

For clarity, plagiarism would include (but is not limited to) copying phrases, blocks of text, tables, or graphics from any source without citing the source. Furthermore, in no instance is a student permitted to copy from a fellow student, and no student is permitted to paraphrase another student's work except in the explicit context of critiquing that work (proposal reviews and presentation evaluations).

If there is any doubt in the student's mind of whether work to be submitted might be construed as plagiarized material, the student should consult with the instructor well before the deadline for submission of the assignment. It is the student's responsibility to write and present material that is free of plagiarism.

*Additional information on plagiarism as it to the upper division-writing requirement is provided below.*

## Resources

The PowerPoint lectures and additional materials such as journal articles will be posted to Canvas

## Diversity, Equity, and Inclusion

**CAFE Inclusion Statement**

Faculty and staff of the College of Agriculture, Food and Environment (CAFE) are committed to creating an inclusive environment of mutual respect where students are encouraged to achieve

their highest potential, regardless of, but not limited to race, ethnicity, gender identity and expression, sexual orientation, national origin, religion, age, ability, and socioeconomic status. The goal is to work together as a diverse group of engaged students, faculty, and staff to ensure all feel welcome, safe, accepted, and included.

## Student Resources

*The University offers a variety of resources to students. Visit the University Senate's Resources Available to Students to access that list (https://www.uky.edu/universitysenate/student-resources).*

## Classroom Behavior Policies

Cell phones and other electronic devices must be rendered silent during class unless there is a documented reason otherwise

## Course Recordings

If the class is required to switch to a virtual mode, meetings of this course may be recorded. All recordings of lecturers are for educational use by students in this class only. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments. Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited.

## Course Copyright

All original instructor-provided content for this course, which may include handouts, assignments, and lectures, is the intellectual property of the instructor(s). Students enrolled in the course this academic term may use the original instructor-provided content for their learning and completion of course requirements this term, but such content must not be reproduced or sold. Students enrolled in the course this academic term are hereby granted permission to use original instructor-provided content for reasonable educational and professional purposes extending beyond this course and term, such as studying for a comprehensive or qualifying examination in a degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship; other uses of original instructor-provided content require written permission from the instructor(s) in advance.

## ABT 301 Communication Requirement

This course partially fulfills the University's upper division composition and communication requirement (GCCR).

**Prerequisites**. This is a communication-intensive course approved to fulfill the University's GCCR. To receive credit for this course, you must have (i) successfully completed the first-year writing requirement (CIS/WRD 110 and 111), (ii) completed at least 30 hours of coursework, and (iii) successfully completed ABT 201.

**Learning Outcomes**. Upon successful completion of this course, students will be able to:

- Write a paper that is essentially free of mechanical errors (grammar, punctuation, spelling, and syntax) and awkwardness, using a style that is appropriate to the purpose and audience.
- Demonstrate an ability to discover, evaluate, and clearly present evidence in support of an argument in the subject area and utilize documentation that conforms to the formats and the citation conventions of the subject area.
- Be aware that composing a successful text frequently takes multiple drafts, with varying degrees of focus on generating, revising, editing, and proofreading.
- Write a capable, interesting essay about a complex issue (discipline-specific) for a general university audience.

Writing Assignment. In this course, students will be required to write a formal research proposal of at least 10 pages that is drafted, peer reviewed, and revised before grading by the instructor. This writing assignment will focus on description of a specific research project and will include relevant background information from the peer-reviewed scientific literature, formal statement of hypothesis and/or goals, experimental rationale, experimental methods, data analysis methods, and expected experimental results and implications. In combination with ABT 201, students will meet or exceed the 15 pages needed for completion of the University's GCCR.

**Draft and Review Process**. Writing and revision of drafts is essential to effective composition and scientific writing. Scientific writing also differs from some other styles of composition in that it contains highly technical language with scientists placing great emphasis on precise, clear and concise writing. The writing assignment will be submitted in draft form for review by the instructor and at least one peer (student) reviewer. Drafts are expected and must be complete documents that satisfy all of the specific criteria outlined by the instructor. The instructor retains the option to also distribute the draft to scientists with specific expertise in the area of study. Before submission of the final paper, it must be read, revised if necessary and approved by at least one other student who will be assigned by the instructor.

**Grading of Assignment**. To pass the course and fulfill the GCCR, you must submit the research proposal (draft and final versions) and earn a grade of C or better on each. If you receive a D or below on the draft version of the research proposal, it must be revised to reflect competency and resubmitted. In the event that the draft version received a D or below, you have one (1) opportunity to resubmit this assignment; this must be immediately done in close consultation with the instructor**. If you fail to achieve at least a C grade on either this second draft version or the final version of the research proposal, you will receive a failing grade for the course.** Note that assignments or requirements other than the formal writing become a factor in the final determination of your course grade *only* if you have achieved a grade of C or higher on both the draft *and* final versions of the research proposal.

Part II of *Student Rights and Responsibilities* (*http://www.uky.edu/StudentAffairs/Code/part2.html*) 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 anything else from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work, whether it be published article, chapter of a book, a paper from a friend or some file, or whatever. 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. (Section 6.3.1).

The minimum penalty for an academic offense, such as cheating or plagiarism, is a "0" on the assignment. Repeated offenses will result in more serious penalties. Students should be aware that failure of the course, suspension and dismissal from the University are also possible sanctions associated with either of these academic offenses.

# GENETICS (ABT/ENT 360) Spring 2022
# Agricultural Sci. Building North Rm. N12

| | |
|---|---|
| **Lecture** | **Tuesday-Thursday 2:00– 3:15 pm** |
| **Instructor** | **Dr. Tonja Fisher** |
| **Office** | **Ag Science Center North Room S-225 F** |
| **Office Hours** | **Tuesday 3:15-4:30 pm or by appointment** |
| **Email** | **tonja.fisher@uky.edu (preferred method)** |
| **Telephone** | **859-562-2563** |
| **Textbook Details** | **TITLE:** Principles of Genetics, Peter D. Snustad & Michael J. Simmons ($7^{th}$ edition) |

**Objective.** This course introduces the principles of classical genetics, molecular genetics, and population genetics. Greater emphasis is placed on molecular genetics and the understanding of transcription, translation, DNA replication and gene expression. You should expect to acquire an understanding of the basic principles and vocabulary of genetics. Mastering and understanding the terminology is a pre-requisite for understanding the field. Genetics is an exciting and important field of biology that is impacting our society in real time. I will discuss current topics related to genetics and encourage you to follow the news reports in this area. This is an introductory course that approaches the various topics in a way to prepare you for further study in genetics, such as ABT 460 (molecular genetics), ABT 461 (population genetics), or BCH 401 (Biochemistry), each of which builds on the basic concepts that you will learn in this course.

**Prerequisites.** One year of general biology (including an introduction to cell biology and genetics) and one semester of general chemistry or the equivalent. If you do not meet these prerequisites, please see me after class.

**Reading Assignments:** Readings in the textbook are listed on the syllabus and on Canvas. I may occasionally assign additional reading or other assignments. Although you *might* pass the class by skipping the reading assignments, most students require both the readings and lecture materials to do well. To do well, read the assigned chapters, multiple times and study them ideally *before* the class in which that material will be discussed! Then review and focus on materials that are covered in depth in lecture and in the text when preparing for exams.

**Other Supporting Materials.** A variety of other materials, podcasts, websites, videos etc. will be mentioned in class and posted to Canvas where they will be available to you.

**Attendance.** Class attendance is not taken, however quick quizzes are given daily and earns credit (55 pts total) within the grading rubric. So attendance is not required but is critically important for success in course.

**Exams and Grading.**
***Exams*:** (500 points in total): There will be four hourly exams (100 pts each) and a comprehensive final exam (100 pts). Tests will focus on materials presented or assigned in class and/or available in the textbook.

**Attend a Genetics-related Research Seminar (15 pts).** At any time in the semester you can attend a genetics-related research seminar on any topic that interests you, document your attendance by sending an email to me with the title, seminar speaker's name, time of seminar and department sponsoring the seminar and then summarize the main points of the presentation.

**Genetics in the News (80 pts total – 4 @ 20 pts each).** The objective of this assignment is to make you aware of the current events in the field of genetics and interest you in following these and similar stories for the rest of your life. Each student is required to send a short summary (~1 page) that includes the website link and the book chapter/lecture topic the news article is associated with to the instructor and give a brief summary in class. It may be helpful to sign up for a Genetics-related news service such as Genetic Engineering and Biotechnology News (e.g. Genetic Engineering & Biotechnology News <update@genmail.co>) or 'The Scientist'.

**Extra Credit Assignments.**
**Book Review (20 pts).** At any time in the semester you can identify a popular non-fiction book about Genetics that you want to read and I will approve it if the book is appropriate and not being reviewed by another student. Examples of books that are appropriate are:
The Gene An Intimate History: Siddhartha Mukherjee; The Double Helix: James Watson
Mapping Fate: Alice Wexler.

**AMBT 395/399 Presentations (10 pts).** The AMBT 395/399 student presentations are usually Tuesday and/or Thursday of prep week. Attending at least two of these student presentations will provide exposure to this program requirement and support students in the program.

***Grades***: Grades will then be earned based on the following scale:

90 % or greater – A
80 % to 89.9% – B
70 % to 79.9% – C
60 % to 69.9% – D
Less than 60 % – E

If final grades are lower than I consider appropriate based upon the effort of the class, a curve may be imposed that results in higher grades for the final grade. Curves are not imposed on individual exams. A curve will not lower grades below what students earn using a 10 percentage point scale.

**Missed Exams.** Make-up exams will be given *only if an absence is pre-arranged or if a valid excuse is provided (as per university regulations which are posted at http://www.uky.edu/Ombud/)*. An unexcused absence from an exam will result in a zero for that exam. Make-up exams will be given during office hours (as defined in this syllabus) or by appointment.

In very rare circumstances, a make-up exam may not be given and an individual student's grade may simply be calculated based on their performance on graded assignments and a reduced number of total points.

**COVID-19 Policies:** Students are expected to follow all COVID-19 policies set forth by the University. Students failing to follow UK's health and safety guidelines related to COVID-19 will be referred to the Office of Student Conduct. Please refer to the Campus COVID-19 Policies webpage for detailed information.

**Class Recording Notification:** The University of Kentucky Student Code of Conduct defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress.
Meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are available only through the Canvas shell for this course and are not to be copied, shared, or redistributed.

As addressed in the Student Code of Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. In anticipation of such cases, students may be asked to complete an "authorization of use" form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

**Course Copyright:** All content for this course, including handouts, assignments, and lectures are the intellectual property of the instructors and cannot be reproduced or sold without prior permission from the instructors. A student may use the material for reasonable educational and professional purposes extending beyond this class, such as studying for a comprehensive or qualifying examination in a degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship.

**Technology Information and Requirements:** Minimum technical requirements for UK courses and suggested hardware, software, and internet connections are available at ITS Student Hardware & Software Guidelines. For account help, contact UK's Information Technology Customer Services online, by email, or by phone at 859-218-HELP (4357).

**Midterm Grades for Undergraduate Students (Senate Rules 6.1.3.1):** Mid-term grades will be posted in myUK by the deadline established in the Academic Calendar.

**Academic Policy Statements:** Please refer to the Academic Policy Statements webpage for detailed information on excused absences and acceptable excuses, religious observances, verification of absences, make-up work, excused absences for military duties, unexcused absences, Prep Week and Reading Days, accommodation due to disability, and non-discrimination statement and Title IX information.

**Rules Regarding Academic Offenses:** Please refer to the Academic Offenses Rules for Undergraduate and Graduate Students webpage for detailed information on plagiarism, cheating, and misuse of academic records.

**Diversity, Equity, and Inclusion:** Please refer to the Diversity, Equity, and Inclusion webpage for detailed information on the University of Kentucky's commitment to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community.
Faculty and staff of the College of Agriculture, Food and Environment are committed to creating an inclusive environment of mutual respect where students are encouraged to achieve their highest potential, regardless of, but not limited to race, ethnicity, gender identity and expression, sexual orientation, national origin, religion, age, ability, and socioeconomic status. The goal is to work together as a diverse group of engaged students, faculty, and staff to ensure all feel welcome, safe, accepted, and included.

**Resources Available to Students:** Please refer to the Resources Available for Students webpage for detailed information on Bias Incident Support Service (BISS), UK Counseling Center, Disability Resource Center, Libraries, Martin Luther King Center, Non-discrimination/Title IX, Office of LGBTQ* Resources, Veterans Resource Center, and Violence Intervention and Prevention Center.

# CLASS SCHEDULE

| Date | | Topic | Chapter | QQ |
|---|---|---|---|---|
| Tues. | Jan. 11 | The Science of Genetics | 1 | 1 |
| Thurs. | Jan. 13 | Cells and Chromosomes | 2 | 2 |
| Tues. | Jan. 18 | Mendelian Genetics | 3 | 3 |
| Thurs. | Jan. 20 | Extensions of Mendelism | 4 | 4 |
| Tues. | Jan. 25 | Chromosomes and Heredity | 5 | 5 |
| Thurs. | Jan. 27 | Variations in Chromosome | 6 | 6 |
| **Tues.** | **Feb. 1** | **Genetics in the News 1/Review Day** | | |
| **Thurs.** | **Feb. 3** | **Exam 1 (1-5)** | | |
| Tues. | Feb. 8 | Linkage and Crossing Over | 7 | 7 |
| Thurs. | Feb. 10 | Bacterial and Viral Genetics | 8 | 8 |
| Tues. | Feb. 15 | DNA Molecular Structure of Chromosomes | 9 | 9 |
| Thurs. | Feb. 17 | Replication of DNA and Chromosomes | 10 | 10 |
| Tues. | Feb. 22 | Transcription and RNA processing | 11 | 11 |
| **Thurs.** | **Feb. 24** | **Genetics in the News 2/Review Day** | | |
| **Tues.** | **Mar. 1** | **Exam 2 (6-10)** | | |
| Thurs. | Mar. 3 | Translation and the Genetic Code | 12 | 12 |
| Tues. | Mar. 8 | Origin of Genetic Variation | 13 | 13 |
| Thurs. | Mar. 10 | Techniques of Molecular Genetics/Genomics | 14/15 | 14 |
| Tues. | Mar. 14-19 | **Spring Break** | | |
| Tues. | Mar. 22 | Applications of Molecular Genetics | 16 | 15 |
| Thurs. | Mar. 24 | Prokaryotic Gene Regulation | 17 | 16 |
| **Tues.** | **Mar. 29** | **Genetics in the News 3/Review Day** | | |
| **Thurs.** | **Mar. 31** | **Exam 3 (11-16)** | | |
| Tues. | Apr. 5 | Eukaryotic Gene Regulation | 18 | 17 |
| Thurs. | Apr. 7 | Transposable Genetic Elements | 21 | 18 |
| Tues. | Apr. 12 | Genetic Regulation of Cancer | 23 | 19 |
| Thurs. | Apr. 14 | Genetic Regulation of Development | 22 | 20 |
| Tues. | Apr. 19 | Quantitative and Population Genetics/**Genetic in the News 4/Review Day** | 19/20 | 21 |
| **Thurs.** | **Apr. 21** | **Exam 4 (17-23)** | | |
| Tues. | Tue. 26 | **Prep Week** | | |
| **Thurs.** | **May 5th** | **Final Exam (1-18, 21-23) 1-3pm** | | |

Red font indicates required in-person attendance.

# ABT 395 - 001 Independent study in biotechnology

- Home
- Syllabus
- Modules
- My Grades
- Announcements
- Academic Resources

## Syllabus

### My Contact Information

Dr. Aardra Kachroo
215 Plant Science Building
(859) 218-1292
Aardra.Kachroo@uky.edu
OFFICE HOURS: Arranged as needed.

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**COURSE DESCRIPTION**

**ABT 395**: Independent study in biotechnology under the supervision of a faculty member. 1 to 3 credits hours/semester.

Prerequisite: Agricultural & Medical Biotechnology major and consent of advisor before registration.

The course may be repeated for a maximum of 6 credits. Students MUST complete course requirements to receive credit each time they enroll. i.e. Students may enroll for additional credit hours only after they have completed course requirements and received a grade that meets the program requirement.

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**ESSENTIAL COURSE REQUIREMENTS**

Please note that there are 4 essential elements required to successfully complete your independent course of study:

1. Verification of an Agricultural & Medical Biotechnology program-approved Research Project Proposal
2. Completion of the approved research activities under the supervision of a faculty mentor
3. Presentation of an Oral Report (see below) **approved by the research mentor**

4. Submission of a Written Report (see below) **approved by the research mentor. It is imperative that you discuss your report and presentation with your mentor WELL IN ADVANCE to allow them the opportunity to comment/edit/approve. This is a course REQUIREMENT. Non approved presentations/reports or those provided to mentors at the last minute, will NOT be graded.**

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**VERIFICATION OF APPROVED RESEARCH PROJECTS AND MENTORS**

**ALL** currently enrolled ABT 395/399, or previously enrolled students who have earned an "Incomplete" as a course grade, must indicate on the Student Information Sheet when your ABT 395/399 proposal was approved and by whom. If your proposal is the proposal that you completed in ABT 301, please provide the semester you took ABT 301 and the instructor's name.

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MANDATORY INFORMATIONAL MEETING

Informational meeting will be held at **5:00 PM on Thursday, January 13, Plant Science Building Foyer (outside Cameron Williams Auditorium). This meeting is MANDATORY and intended to answer any questions you may have.**

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LEARNING CONTRACT & PHOTO RELEASE DOCUMENT

Due in Canvas by **5:00 PM**, **February 4**

THE PHOTO RELEASE DOCUMENT will serve as guidance for ABT leadership when we consider sharing these materials. Declining consent to the photo release will NOT be used against you in any way, rather inform us not to share your submitted product (written or visual).

V IMP: Even if you have already filed a Student Information Sheet from a previous semester and the contact and project information has not changed, please submit a learning contract for Spring 2022.

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**ORAL PRESENTATION**

1. Presentation title & other Information: Due by **5:00 PM, April 11**, the **a)** presentation title, **b)** Full name, departmental affiliation, e-mail address of research mentor, and **c)** any class/work conflicts on the presentation dates. If you do not have any conflicts please indicate accordingly. Request for last minute changes to the presentation schedule will not be entertained except under extenuating circumstances. Dr. Kachroo will try to

schedule a student's seminar time to accommodate their class schedule, etc. **Students who turn in ALL the required information about their seminar (see #1 above) early, will be given preference** in terms of presentation date/time.

2. Presentation schedule will be posted on Canvas, the ABT homepage and disseminated to research mentors and the university community at large, by **April 13**
3. Final oral presentation file (approved by mentor) due in Canvas by **12:00 Noon Monday, April 18 (NO EXCEPTIONS).** The oral presentation must be shared with your mentor WELL in ADVANCE. Last minute submissions to mentor WILL affect your grade.
4. Oral presentations are scheduled on **Tuesday**, **April 19** and **Thursday April 21.** Presentations (a PowerPoint slideshow) should be about **12 minutes** in length. A 2-3 minute question session with the audience will follow each presentation. Although priority of questions will be given to ABT students in the audience, presenters should expect additional questions from faculty members. Individual student practice sessions (PowerPoint slideshow) can be arranged with Dr. Kachroo through April15.

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## WRITTEN REPORT

1. One copy of your written report - along with **mentor approval** (signature on document OR email to Dr. Kachroo) is due in Canvas by **5:00 PM, May 2**. Be sure to provide your written reports to your mentor WELL in ADVANCE for approval. Last minute submissions WILL affect your grade.
2. Format: Any scientific journal of your mentor's choosing with the sections listed below. Overall word limit for items C-H is minimum 3000 words with maximum 900 words per section. Contact me (apkach2@uky.edu) if you have concerns meeting the word limit.
    A. **Cover Page** - Title and list of authors and their affiliations, and signature of the sponsoring research mentor.
    B. **Abstract** - An abbreviated summary of the report's elements (150 words).
    C. **Introduction** - A brief presentation/introduction of topical concepts required by the uninformed reader to understand the background and rational for your study.
    D. **Materials and Methods** - a description of critical reagents, procedures, and assays used to generate experimental data.
    E. **Experimental hypothesis** being tested (e.g.,"The goal of this experiment was to test the effect of X treatment on Y parameter.") **or the purpose of the research** (e.g., "The purpose of the experimentation was to develop an X assay to measure Y parameter."
    F. **Results** - The formal presentation and description of your experimental data. This section must contain a statement indicating that conductance of the experimentation complied with the specific applicable Chemical Hygiene, Radiation Safety, Institutional Biological Safety, and Institutional Animal Care and Use protocols required for you to conduct your project. The experimental design and methods used to statistically analyze your data needs to be presented, including a description of all relevant "control" observations for your assays and the number of observations ("n") for each data group.

G. **Discussion** - A written discussion of your data in terms of what your data revealed, how your data compare to what others have seen in analogous experiments in identical or comparable experimental models, and the physiological/practical relevance of your observations to a given experimental/biological model and/or field of research.
   Note: sometimes it is useful to combine the Results and Discussion sections into a single manuscript component (i.e., a Results and Discussion section).
H. **Conclusions** - A formal statement about the conclusion(s) drawn from your data as it applies to the goal/hypothesis tested in the experiment. That is, did you accept or reject the experimental hypothesis? Was an assay successfully developed? Or, was the data inconclusive for whatever reasons?
I. **References** - A listing of the sources for the citations used in your report.

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## PERSONAL REFLECTIONS

**Due in Canvas by 5:00 PM May 6.**

**For many students ABT 395 represents the pinnacle of their undergraduate research experience, and allows for an important opportunity to reflect on their journey as a scientist through the program. Additionally, while important for your own growth, other peers may also find inspiration from your reflection. For this assignment, you are asked to respond to the prompt below in one of two formats (written or visual), and invited to release that product for the ABT program to share on our website to hopefully inspire past, current, and future students. Declining to publicly share your product will not negatively impact your grade on this assignment, so please do not feel any pressure to do so.**

**Prompt: Evaluate how your experience in the program has influenced your outlook on the relationship between society and biotechnology, and how your personal philosophies and values have been influenced as a consequence of the program.**

**Product option 1** - Video: Record a 2-3 minute video (on a webcam, smartphone, etc.). While we do not expect professional-level videography, please ensure that the camera is not too shaky, the viewer can see your face, and the audio is clear. Also, while notes may be helpful, please try to avoid reading from a script, and focus on a genuine dialogue that will (hopefully!) inspire your peers.

**Product option 2** – Written testimonial: Write a minimum 250-word essay. This product will be assessed for content rather than grammar and diction, but please write it to the best of your ability.

## SUMMARY OF IMPORTANT DATES/DEADLINES FOR SPRING 2022

All assignments are due **in Canvas** by 5:00 PM on the assigned date

1. **5:00 PM January 13**: Mandatory Informational meeting PSB foyer
2. **5:00 PM February 4:** Learning contract & Photo Release documents due
3. **5:00 PM April 11** - Presentation title and other information due
4. **April 13**-Oral presentation schedule posted
5. **April 19 and April 21**-Oral presentations
6. **5:00 PM May 2** -The written report due, MUST be **signed** by your research mentor (or have them email me approval).
7. **5:00 PM May 6**- Personal reflections (written or video format) due

## Grading Policy

***Note for Instructors:*** *Customize this section with grading policy information from your syllabus. Be sure to clearly state your plan for providing feedback on graded assignments. See the example below. Remember to delete this note and any information in this section that is not applicable for your course.*

This course is based on a score of 500 points:

| | | | | |
|---|---|---|---|---|
| A = 500 - 450 points | B = 449 - 400 | C = 399 - 350 | D = 349 - 300 | E = 299 or less |

Assignments are clearly outlined in this Canvas page. It is your responsibility to know when assignments are due. Late work will only be accepted with a documented excused absence.

Assignments will be graded within *the time frame provided by the instructor*. All grades and assignment feedback will be posted on Canvas unless otherwise noted by the instructor.

According to University Rule 5.2.4.2, excused absences include:

1. serious illness;
2. illness or death of family member;
3. University-related trips;
4. major religious holidays (with two-week notice);
5. interviews for full-time job opportunities post-graduation and for graduate or professional school*;
6. other circumstances you find to be "reasonable cause for nonattendance".

Should an excused absence arise, I expect you will contact me as soon as possible. Your progress and success will depend upon it.

Grades will be composed of the following components

250 points (a) Faculty mentor's evaluation of the student's research performance in all aspects of the project: Effort & engagement (50%); Quality of data generated and/or analyzed (20%); Overall understanding of research topic (15%); Quality of written report and presentation (15%). The percentages are guidelines only. Some mentors may prefer to redistribute the weightage for these components. If so, mentors will be asked to convey changes to the student.

100 points (b) Written Report
100 points (b) Oral Presentation

20 points (b) Learning Contract & Photo Release document
20 points (b) Personal Reflection Statement (graded for timely submission only)

10 points (b) Mandatory Class Meeting

**(a) - This portion of the course will be determined after consultation of the research mentor/faculty member by the course instructor.**
**(b) - This portion of the course grade will be determined by the course instructor.**

# Course: ABT 396-001

## Title: **RESEARCH EXPERIENCE IN BIOTECHNOLOGY**

Term: Spring 2022
Credit hours: 1-4 depending on contact hours
Meeting days/time/location: TBD with faculty research mentor

### Instructor Information

Name: Dr. Sharyn Perry
Email: sperr2@uky.edu
Office building and room number: Plant Science Building, room 307
Office phone: (859)-218-0732
Office hours: by appointment. Please call or email me to set up an appointment.

### Course Description

***Overview***

Research experience in biotechnology under the supervision of a faculty member. One to four credit hours/semester. The course may be repeated for a maximum of six credits, but the student must meet the requirements each semester to allow enrollment. Each credit hour is equivalent to 48 hours in the lab during the semester (3 hours per week for each credit hour; 16 weeks to the semester).

1 credit hour – 48 hours worked for the semester
2 credit hours – 96 hours worked for the semester
3 credit hours – 144 hours worked for the semester
4 credit hours – 192 hours worked for the semester.

### Course Prerequisites

Enrollment in the Agricultural and Medical Biotechnology major, consent of advisor before registration, and identification of a faculty research mentor. An Independent Research Contract approved by the faculty mentor and delivered to the instructor is required prior to registration. This course will further the students' experience with science, enhance their appreciation for the scientific process, and what it means to conduct scientific research.

### Required Materials

none

### Associated Expenses

none

### Activities Outside of Regular Class Meetings

TBD by the faculty mentor

### Skill and Technology Requirements

TBD by the faculty mentor

*For technical/account help, students can contact Information Technology Services by phone 859-218-HELP (4357) and via the ITS Customer Services page. (https://www.uky.edu/its/customer-support-student-it-enablement/customer-services)*

## Student Learning Outcomes

1) Demonstrate proficiency in the scientific method.
2) Defend the results of their experiments by presenting their research in a poster format and communicating this research as a poster presentation to attendees of the ABT395/399 talks. Alternatively, a written report may be submitted.

## Course Details

### *Tentative Course Schedule*

January 13, 2022 – Last day to submit a completed learning contract to add ABT396 (last add date is Jan. 14).
March 14, 2022 – I will check in with your mentor about progress so that I may submit a midterm grade.
April 28, 2022 – Final poster or report is due via Canvas.

### *Course Activities and Exams*

1. Verification of an Agricultural and Medical Biotechnology program-approved Independent Research Contract.
2. Completion of the approved research activities under the supervision of a faculty mentor.
3. Presentation of a poster at the ABT395/399 presentations or submission of a final report that has been **approved by the research mentor. It is imperative that you discuss your poster/report with your mentor to allow them the opportunity to comment/edit/approve. This is more than just a courtesy since the data are "owned" by the lab (i.e., the faculty member with whom you performed your research).**

**INSTRUCTIONS FOR THE POSTER/REPORT**

4. **Please NOTE: the ABT396 poster/report is distinct from the ABT395/399 written report and oral presentation that is major requirement.**
5. The poster/report for ABT396 should include an abstract, background information, methods, results, and discussion. Please include acknowledgments and references as needed. Your mentor must send the course instructor an e-mail saying that they have approved the poster or report prior to submission (by April 25, 2022).
6. If you choose to do a poster, you will present your poster at the ABT395/399 talks that are held at the end of each semester in the Plant Science Building. The posters will be displayed in the lobby (pending any COVID-19 restrictions). Failure to present your poster will result in an "Incomplete" and you will not be allowed to register for additional ABT396 credits until this incomplete is resolved.
7. If you choose to do a report, you must have 2 pages (double spaced) per credit of 396. Thus, a student taking 4 credits of ABT396 will be expected to produce a longer (8 pages), more detailed report than a student just starting in the lab and taking 1 credit (2 page report). Please note, the page requirement does not include references. You may go over the page limit.

### *Grading*

Please note that there are <u>three essential elements</u> required to successfully complete ABT396:

10%  (b) A completely and correctly filled out Independent Research Contract signed by the student, faculty mentor and 396 coordinator (this last is S. Perry): https://abt.ca.uky.edu/files/abt396_independent_study_contract.pdf
80%  (a) Faculty mentor's evaluation of the student's research performance in all aspects of the project (effort, engagement, data production and analyses, notebook, etc.)
10%  (b) Poster presentation or final written report

(a) - This portion of the course will be determined after consultation of the research mentor/faculty member by the course instructor.
(b) - This portion of the course grade will be determined by the course instructor.

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## GRADE ASSIGNMENTS

90% and above = A
80% to 89% = B
70% to 79% = C
60% to 69% = D
59% and below = E

### *SUMMARY OF IMPORTANT DATES/DEADLINES FOR ABT 396*

1. **January 13th, 2022** – Dr. Perry must have a completed and signed learning contract by this day to allow you to add ABT396 for the semester.
2. **April 25th, 2022** – Dr. Perry must receive an email from your faculty mentor approving the poster.
3. **April 28th, 2022–** You must submit your poster (hopefully you can present it during the ABT395/399 talks in the lobby of the Plant Science Building as your schedule allows – this will depend on COVID-19 restrictions in place at that time). As an alternate you may submit a report. However, you are encouraged to prepare a poster, especially if you are enrolled in 3-4 cr of ABT396 that is useful at multiple venues. Examples will be available on Canvas. Alternatively, you may submit a final written report to Dr. Perry by this date.

### ***PLAGIARISM***

Part II of *Student Rights and Responsibilities* (6.3.1; online at http://www.uky.edu/StudentAffairs/Code/part2.html) 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 anything else from another source without appropriate acknowledgment of the fact, the students are guilty of plagiarism.

Plagiarism includes reproducing someone else's work, whether it is a published article, chapter of a book, a paper from a friend or some file, or whatever. 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.

### *Midterm Grades*

*For undergraduates, midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar. (http://www.uky.edu/registrar/content/academic-calendar)*

### *Attendance Policy/Acceptable Documentation*

N/A

## Assignment Policies

### *Assignment Submissions*

Please submit all written assignments via Canvas. If you have any problems, please email me.

### *Returning Assignments to Students*

All comments on assignments will be available in Canvas.

### *Late Assignments*

I will consider good reasons to request short extensions on assignments. However, if you submit assignments late, without first contacting me, you should expect a reduction of grade at the rate of 5% per day that the assignment is late. Per the University Senate Rules, within some guidelines late assignments must always be accepted for excused absences. (https://www.uky.edu/universitysenate/rules-regulations).

### *Assignments Due during Prep Week*

The final report is due by Monday December 6th, 2021. This is an allowed due date during "reading week". Early submissions are always welcome.

## Academic Policy Statements

Please see the Senate's Academic Policy Statements, https://www.uky.edu/universitysenate/acadpolicy

## Academic Offenses (Cheating, Plagiarism, and Falsification or Misuse of Academic Records)

Please refer to Rules Regarding Academic Offenses, https://www.uky.edu/universitysenate/ao

## Resources

University of Kentucky home page: http://www.uky.edu/

ISI Web of Knowledge:
Go to UK libraries: http://libraries.uky.edu/; click database tab; click "W"; select "web of science" or "J" for Journal Citation Reports. At some point you will have to log in with UK ID and password.

Pubmed.gov: https://pubmed.ncbi.nlm.nih.gov/

The Robert E. Hemenway Writing Center: https://wrd.as.uky.edu/writing-center

## Diversity, Equity, and Inclusion

*The University of Kentucky is committed to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community (Governing Regulations XIV). We acknowledge and respect the seen and unseen diverse identities and experiences of all members of the university community (https://www.uky.edu/regs/gr14). These identities include but are not limited to those based on race, ethnicity, gender identity and expressions, ideas and perspectives, religious and cultural beliefs, sexual orientation, national origin, age, ability, and socioeconomic status. We are committed to equity and justice and providing a learning and engaging community in which every member is engaged, heard, and valued.*

*We strive to rectify and change behavior that is inconsistent with our principles and commitment to creating a safe, equitable, and anti-racist environment. If students encounter such behavior in a course, they are encouraged to speak with the instructor of record or the college's diversity officer, who is charged with addressing concerns about diversity, equity, and inclusiveness (uky.edu/inclusiveexcellence/college-diversity-inclusion-officers). Students may also contact a faculty member within the department, program director, the director of undergraduate or graduate studies, the department chair, or the dean. To submit an official report of bias, hatred, racism, or identity-based violence, visit the Bias Incident Support Services website (https://www.uky.edu/biss/report-bias-incident).*

## Student Resources

*The University offers a variety of resources to students. Visit the University Senate's Resources Available to Students to access that list (https://www.uky.edu/universitysenate/student-resources).*

## Classroom Behavior Policies

N/A

## Course Recordings

N/A

## Course Copyright

It is very important that you discuss your presentation with your faculty mentor. Sometimes there are intellectual property rights that prevent sharing of data prior to licensing. Whatever data you generate in your mentor's lab belongs to that lab and not to you, so please get approval to share any findings.

# Course: ABT 460-001
## Introduction to Molecular Genetics

Term: Fall 2021
Credit hours: 3
Meeting days/time/location: MW 2:00 – 3:15 pm, Ag. Science Bldg. North, N-10

### Instructor Information

Name: Dr. Olga Tsyusko
Email: olga.tsyusko@uky.edu
Office building and room number: Ag Science Bldg. North, Room N-122Q
Office phone: (859) 257-1777
Office hours: By appointment. Meetings can be conducted either *in person* (safety permitting) or by *Zoom at* [https://uky.zoom.us/j/8592571777](https://uky.zoom.us/j/8592571777)

### Course Description

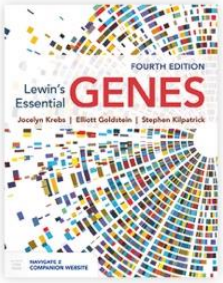
ABT 460 is designed to provide students with an introduction to the molecular structure of DNA and its function, molecular mechanisms underlying DNA replication, prokaryotic and eukaryotic transcription, and translation, as well as RNA processing, recombination and the theoretical underpinnings of genetic engineering. With an understanding of the fundamentals of molecular genetics, we will apply this knowledge to development, evolution and disease.

### Course Prerequisites

Equivalent of ABT/ASC/ENT 360 or BIO 304 (The Principles of Genetics). If you do not meet these prerequisites, please let me know after the first class.

### Recommended Textbook

Textbook Details
Title: Lewin's Essential Genes (4th edition)
Authors: Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick
Publication Date: 2021
Publisher: Jones & Bartlett Learning




### Technology Requirements

I will ask you to bring your laptops to some of the class meetings for in-class work. We will also use an open-source software, which works with PC or Mac, for DNA sequencing analysis

## Student Learning Outcomes

*After completing this course, the student will be able to gain a better understanding of:*

- *The role of DNA, RNA and proteins in heredity*
- *Relationship between structure and function of genome*
- *Molecular mechanisms involved in gene expression and its regulation*
- *Molecular events involved in DNA repair*
- *Differences between prokaryotes and eukaryotes in their fundamental processes*

## Course Details

**Expectations**

- ABT 460 covers advanced and difficult material, so sufficient study is essential for a good grade. An average of **six to nine (6-9) hours per week outside class** is considered **normal study time** for a 3 credit-class. Make sure to get sufficient sleep, exercise and nutrition for proper focus during studying. The assigned reading for each lecture averages 20 -30 pages. Read these thoroughly and repeatedly to fully understand them, discuss the material with classmates and others as you see fit, and ask questions.
- You will be responsible for the information in the assigned readings, with emphasis on material covered in the lectures. In some cases, I may inform you of specific sections that are excluded from the reading assignment. However, those sections may include terms and concepts that you need to know, in which event that information will be communicated in lecture. We will also have 2-3 guest lecturers and they will recommend additional materials for you to review prior and after their lectures. These materials will be posted on Canvas.
- Use the "**Key Concepts**" boxes in your text readings as a guide to the basic concepts and principles.
- Understand the terms shown in **bold** and defined in the glossary. You must be able to write short definitions of each. However, rather than memorizing the definition, you need to understand the concept underlying the term.

### *Course Activities and Exams*

**Exams:**

- There will be four exams. Each exam will cover course materials from textbook as well as PowerPoint presentations and guest lectures.
- Exams will be "open-book" - that is, you can use any materials and resources to address the questions during the exam, as long as you properly cite/credit the sources. Exams will be concluded during the assigned class periods.
- Each exam will test your knowledge of the materials covered in lectures and assigned readings or other assigned details (this may include videos, podcasts, website content, or information provided in other media).
- Each exam is 20% of your total grade.
- With the exception of the final exam, the exams will not cover materials from previous sections (i.e. exam 2 will only cover materials introduced after exam 1). The final exam will include two sections. One section will cover the materials introduced after exam 3, and the other section will be a comprehensive section that will test your knowledge of the course materials as a whole.

**Re-grading exams**: If you lose points on an exam, make sure you know what your error was; similar questions may well be asked again. If on careful consideration you still believe that you were counted wrong for the correct answer, you may bring the test to me for reconsideration. Be aware of two things, however: (1) the instructor will photocopy or save the files of all work before returning it, to protect

against cheating (see Academic Honesty); (2) If you ask the instructor to regrade a test, then the whole test will be regraded, with the possible results of a higher mark, a lower mark, or no change. This policy is not to discourage inquiry, but rather is to encourage you to think thoroughly about the questions, and thereby learn from the experience.

**Other graded work:** We will have various graded exercises both during and outside of class—some of these will be announced, some will be unannounced. These exercises will include quizzes, problem sets, and response writing. These exercises will vary in terms of their point value, but together will comprise 15% of your grade, with approximately 2%-5% of your total grade per assignment. Note that unexcused absences will preclude your ability to complete in-class assignments

**Journal Club Presentation**: Genetics is an active area of research that is changing daily. Thus, it is important to keep up with the scientific literature to learn new developments in your field. On "Journal Club", we will spend the last 15-20 minutes of class discussing a current scientific paper in the general area of molecular genetics. Students will take turns leading these discussions. This is a group assignment (likely 2-3 students/group). The assigned group of students will select a paper and distribute it to the class a week prior, and on the day of the discussion the students will give a short presentation and lead a discussion of the paper. The journal club presentation constitutes 5% of the total grade.

## Grading Scale

An E without a chance to re-take the class will result from failure due to cheating or plagiarism. If the occasion arises that the scores are significantly lower than expected, I may apply a curve to lower the percentages required for each letter grade. I will not curve the class to increase percentages required for each letter grade.

Exam 1 20%
Exam 2 20%
Exam 3 20%
Final exam 20%
In-class and out-class work 15%
Journal Club Presentation 5%
Total 100%

You will be graded according to the above chart. As you can see, exams count for 80% of your grade
Grades will then be awarded based on the following scale:
90 % or greater = A
80 to 89% = B
70 to 79% = C
60 to 69% = D
Less than 60% = E

### *Midterm Grades*

Midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar. (http://www.uky.edu/registrar/content/academic-calendar)

## Attendance Policy/Acceptable Documentation

**Absences**: Students are expected to abide by the student code of conduct as described by the office of student affairs (http://www.uky.edu/StudentAffairs/Code/). Unexcused absences will result in a 2%

deduction. If you know ahead of time that you will be missing a class period, I strongly encourage you to notify me prior to the day of the class.

**Missed exams**: Make-up exams will be given only if an absence is pre-arranged (at least one week in advance) or if a valid excuse is provided (as per university regulations, which are posted at http://www.uky.edu/Ombud/). If you know of a conflict that will preclude you taking an exam at the appointed date and time, you must inform me and provide official documentation. That documentation must refer to the specific dates in question. If you are unable to inform me ahead of time, you must provide official documentation for your absence at your earliest opportunity afterward. An unexcused absence from an exam will result in a zero for that exam. There will be no exceptions to this rule. A missed exam will not be dropped from the final grade. Make-up exams will be given during scheduled meeting immediately following your return. Note to student athletes: You must make arrangements at least one week in advance, with a note from the athletics department, if you will miss an exam for a sporting event.

**Disability**: If you have a documented disability that requires academic accommodations, please see me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (725 Rose Street, Suite 407, 859-257-2754, e-mail address: dtbeac1@uky.edu) for coordination of campus disability services available to students with disabilities.

## Assignment Policies

### *Assignment Submissions*

Assignments (quizzes, problem set or response writing) can be submitted through Canvas or turned in as a hard copy.

### *Returning Assignments to Students*

The exams and assignments will be returned to students via Canvas within one week after they were administered.

### *Late Assignments*

Assignments based on in-class exercises will not be accepted for unexcused absences. For late assignment submission, you will lose 3% per day. The exams should be turned in at the end of the class period. Per the University Senate Rules, late assignments will be accepted for excused absences.(https://www.uky.edu/universitysenate/rules-regulations)]

### *Assignments Due during Prep Week*

No assignments will be due during the prep week.

## Academic Policy Statements

You are required to follow requirements of the official policies established in the *University Senate Rules* (https://www.uky.edu/universitysenate/acadpolicy)

## Academic Offenses (Cheating, Plagiarism, and Falsification or Misuse of Academic Records)

### Academic Honesty

It is your responsibility to familiarize yourself with the definitions of and sanctions for cheating and plagiarism at the University of Kentucky. Information on plagiarism at the University of Kentucky can be found at the following site: http://www.uky.edu/Ombud/Plagiarism.pdf.

For exams, the following will be considered evidence of cheating:

- Communicating in any way with classmates
- Accessing any electronic device that can send, receive, display, or play back information in any form
- Availing yourself of any written or printed material except what is explicitly allowed by the instructor
- Looking at the exam of a neighbor
- Adjusting body position to ensure that a neighbor can view your exam

**The first cheating/plagiarism infraction will result in zero credit for the exam. Any second infraction will incur an E (failing) grade for the course.**
Rules governing cheating and plagiarism are in accord with Section VI of the code of student conduct (http://www.uky.edu/StudentAffairs/Code/part2.html).

## Resources

The textbook materials, PowerPoint lectures, suggested videos and additional materials distributed to the students for the lectures that fall outside of the textbook as well as materials suggested by the guest lecturers.

## Diversity, Equity, and Inclusion

**CAFE Inclusion Statement**
Faculty and staff of the College of Agriculture, Food and Environment (CAFE) are committed to creating an inclusive environment of mutual respect where students are encouraged to achieve their highest potential, regardless of, but not limited to race, ethnicity, gender identity and expression, sexual orientation, national origin, religion, age, ability, and socioeconomic status. The goal is to work together as a diverse group of engaged students, faculty, and staff to ensure all feel welcome, safe, accepted, and included.

## Student Resources

*The University offers a variety of resources to students. Visit the University Senate's Resources Available to Students to access that list (https://www.uky.edu/universitysenate/student-resources).*

## Classroom Behavior Policies

Cell phones and other electronic devices must be rendered silent during class unless there is a documented reason otherwise

## Course Recordings

If the class is required to switch to a virtual mode, meetings of this course may be recorded. All recordings of lecturers are for educational use by students in this class only. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments. Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited.

## Course Copyright

All original instructor-provided content for this course, which may include handouts, assignments, and lectures, is the intellectual property of the instructor(s). Students enrolled in the course this academic term may use the original instructor-provided content for their learning and completion of course

requirements this term, but such content must not be reproduced or sold. Students enrolled in the course this academic term are hereby granted permission to use original instructor-provided content for reasonable educational and professional purposes extending beyond this course and term, such as studying for a comprehensive or qualifying examination in a degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship; other uses of original instructor-provided content require written permission from the instructor(s) in advance.

## Tentative Course Schedule (ABT 460, Fall 2021)

| Day/Lecture | Date* | Topic | Reading | JCP** |
|---|---|---|---|---|
| M | 23 Aug | Course Introduction | | |
| **Module 1 Genes and Chromosomes** | | | | |
| W/1 | 25 Aug | DNA and RNA | Chpt 1 | |
| M/2 | 30 Aug | DNA and Chromosomes | Chpt 1, 7 | |
| W/3 | 01 Sep | Amino Acids and Polypeptides | --- | |
| | 06 Sep | Labor Day- No class | | |
| W/4 | 08 Sep | Exons and Introns | Chpt 3 | |
| M/5 | 13 Sep | Genomes | Chpt 4 | |
| W/6 | 15 Sep | Population Genetics and Evolution | --- | |
| M/7 | 20 Sep | DNA Sequence analysis | | |
| **W** | **22 Sep** | **Exam 1 (Covers materials up to 09/15)** | | |
| **Module 2 DNA Replication and Recombination** | | | | |
| M/8 | 27 Sep | DNA Replication | Chpt 10 | |
| W/9 | 29 Sep | DNA Replication | Chpt 11 | Group 1 |
| M/10 | 04 Oct | DNA Recombination | Chpt 13 | |
| W/11 | 06 Oct | Mutations and DNA Repair | Chpt 14 | Group 2 |
| M/12 | 11 Oct | Methods in Molecular Biology | Chpt 2 | |
| W/13 | 13 Oct | Genetics of Cancer (by Dr Blackburn) | --- | |
| **M** | **18 Oct** | **Exam 2 (Covers materials up to 10/13)** | | |
| **Module 3 Gene Expression** | | | | |
| W/14 | 20 Oct | Prokaryotic transcription | Chpt 16 | Group 3 |
| | 25 Oct | Midterm Break – No class | | |
| W/15 | 27 Oct | Eukaryotic transcription | Chpt 17 | Group 4 |
| M/16 | 01 Nov | Translation | Chpt 21 | |
| W/17 | 03 Nov | RNAi and biocontrol (by Dr. Unrine) | --- | |
| M/18 | 08 Nov | Genetic control in development and aging | --- | |
| W/19 | 10 Nov | RNA splicing and processing | Chpt 18 | Group 5 |
| M | 15 Nov | **Exam 3 (Covers materials up to 11/10)** | | |
| **Module 4 Gene Regulation** | | | | |
| W/20 | 17 Nov | Procaryotic gene regulation | Chpt 23 | Group 6 |
| M/21 | 22 Nov | Eukaryotic gene regulation | Chpt 25 | |
| | 24 Nov | Thanksgiving Break – No class | | |
| M/22 | 29 Nov | Epigenetics | Chpt 26 | Group 7 |
| W/23 | 01 Dec | Regulatory RNA | Chpt 28 | |
| M/24 | 06 Dec | Genetics of Viruses (TBD) | --- | |
| W | 08 Dec | Review for Final | | |
| **W** | **15 Dec** | **Final Exam 3:30-5:30 (materials from all modules)** | | |

*****This schedule is flexible; I may get ahead of or behind this schedule at any time. I also reserve the right to reorganize the schedule if necessary.

**Journal Club Presentation (tentative)

--- The material is outside of the textbook and will be relying on lectures and additional resources, which will be provided through Canvas

**ABT/ENT/FOR/BIO 461G Introduction to Population Genetics**
**Spring 2022 syllabus**

| | |
|---|---|
| Lecture: | TR 12:30pm – 1:45pm (3 credits); Ag Science Center North, room N-24F |
| Instructor: | Dr. Julian Dupuis (julian.dupuis@uky.edu) |
| Office: | Ag Science Center North, room S-307C |
| Office Hours: | by appointment in person or on Zoom |
| Telephone: | 859-562-2544 (office) |
| Zoom: | if needed, refer to Canvas for Zoom link |

## I. Course description

*Course catalog description:* This survey course examines the population dynamics and equilibria of genes in nuclei, chloroplasts and mitochondria. Emphasis will be on biological relevance (in plants, animals, and micro-organisms), but some theoretical derivations will also be introduced.

Ultimately, this course will serve as an introduction to how **mutation, migration, drift, and selection affect patterns of genetic diversity**, and how we can use this information to understand ancestry and evolution.

### COVID-19 Specifics

Given the ongoing COVID-19 pandemic, this semester *may* operate a bit differently than normal. Throughout the syllabus, **I have noted Spring 2022/COVID-specific content with blue text. Please take specific note of this info!**

### How to be Okay in a Global Pandemic

Despite vaccinations and some on-and-off return to normal, we're still in a global pandemic, and none of us are really okay. If you tell me that you're having trouble, I'm not going to judge you or think less of you. I hope that you'll extend me the same grace.

***Here are a few ground rules:***

- You never owe me personal information about your health (mental or physical), or anything else.
- You are always welcome to talk to me about things that you are going through, and,
- If I can't help you, I can likely direct you to someone who can.
- If you need extra help, or you need to miss an in-person session, or you need more time with something, just ask. I'll work with you.

## II. Course format

The current COVID situation is fluid, and so I plan to remain flexible to changes in class delivery based on what's happening locally/globally, as well as both my feelings and your feelings about being in a relatively full classroom of people. **At least to begin the semester, we will be meeting in-person for lectures in Ag North N-24F.** During the first week of class, I will poll the class to try and get a feel for what y'all are comfortable with and what we could change to make the class more accessible and safer for everyone. Regardless of potential changes in modality, **I will strive to have all lectures recorded in one form or fashion**. I plan to begin doing so with Echo360 and will discuss how these will be available during the first week of class.

Students are expected to have read the assigned material before class. I will communicate any changes to this plan in lecture and via Canvas. **Thus, it is important to make sure your Canvas settings will alert you to announcements for this class.**
3 hours lecture/discussion per week. Attendance at lectures is expected. Slides for lectures will be available as PDFs on Canvas, usually by 5 pm the previous day. I strongly encourage students to either print the slides or have software that allows you to write on the slides during lecture. The slides are comprehensive, and you will find it easier to follow lectures if you can add notes as necessary to the detail already on the slides rather than taking comprehensive notes.

**III. Prerequisite**: Genetics (ABT/ENT 360, BIO 304, or equivalent introductory genetics course) plus a course in probability and statistics.

**IV. Student learning outcomes**
Upon completion of this course, students will be able to:
- Describe the effects that mutation, migration, drift, and selection have on population dynamics/equilibria
- Calculate and interpret basic population genetic statistics
- Contrast commonly used population genetic methodologies/approaches and describe how they can be used to solve applied questions

**V. Recommended materials**
Hamilton, M. B. (2009). Population genetics. Wiley-Blackwell. (in reality, any recent population genetics text would suffice)
Additional readings will be provided on Canvas, and the utility of these readings will be discussed in the first week of class.

**VI. Technology information and requirements**
Parts of this class will be conducted online through the Canvas platform, and thus students are required to have some Canvas-capable device (computer, tablet, etc.). Please let me know if you have issues with internet connectivity or hardware.
Minimum technical requirements for online UK courses and suggested hardware, software, and internet connections are available at ITS Student Hardware & Software Guidelines. For account help, contact UK's Information Technology Customer Services online, by email, or by phone at 859-218-HELP (4357).

**VII. Activities and assessments**
- Exams (3 at 100 pts each = 300 pts)
- Assignments (5 at 10 pts each = 50 pts)
- Graduate student project* (40 pts)
- Presentation evaluations (10 pts)

*Total points: 360 (undergrad), 400 (graduate)*

**Grade breakdown:**
- undergrad:
  - ≥324 pts A
  - 288-323 B

    - 252-287 C
    - 216-251 D
    - <216 E
- graduate
    - ≥364 pts A
    - 328-363 B
    - 292-327 C
    - <292 E

***Graduate student project (40 points)**: All enrolled graduate students are *required* to complete an additional course project. Description and guidelines are provided on Canvas.

**Exams**: Barring a change in modality, exams will be in person.

**Homework assignments**: There will be five homework assignments throughout the class, all assigned and due before the second exam. Assignments will be posted to Canvas one week before they are due. To receive full credit for completing an assignment, a scanned (or photographed) copy of the completed assignment must be uploaded to Canvas ***prior*** to the start of class on the due date. Late work may be docked 10% per day.

**Tentative schedule:** Note: the exam dates are fixed but all other details are subject to change as we progress through the semester. ***I will keep the schedule on Canvas updated, but not this document. For schedule changes, please refer to Canvas!***

| **Week** | **Topic** | **Readings** (Hamilton) |
|---|---|---|
| 1 | Introduction to the course<br>Phenotypic/genetic variation in natural populations | Chapter 1; chapters 3 and 4 of Allendorf et al. (on Canvas) |
| 2 | Mendelian inheritance, probability (review), Hardy-Weinberg | Any genetics text<br>Chapter 2 |
| 3 | Hardy-Weinberg; sex differences, sex linkage; gametic disequilibrium | Chapter 2 |
| 4 | Inbreeding and inbreeding depression<br>Genetic drift, effective population sizes | Chapter 2<br>Chapter 3 |
| 5 | Genetic drift, effective population sizes<br>*Review for exam* | Chapter 3 |
| 6 | ***Exam 1*** *(15 February)*<br>Population subdivision; Wahlund effect, $F_{ST}$, gene flow | Chapter 4 |
| 7 | Population subdivision<br>*Graduate student project proposals due 5PM (24 February)* | Chapter 4 |
| 8 | Population structure, humans, etc.<br>Natural selection | Barbujani & Colonna 2010<br>Chapter 6 |
| 9 | Natural selection | Chapter 6, 7 [pp 208–211, 218–219, 222–226] |
| 10 | **Spring break** | |

| | | |
|---|---|---|
| 11 | Natural selection<br>Mutation<br>*Review for exam* | Chapter 5 [pp 154–164, 166–168, 173–178] |
| 12 | ***Exam 2*** *(29 March)*<br>Molecular evolution: neutral theory, detecting selection | Chapter 8 [235–244, 250–255, 261–280]; Excerpts from Futuyma |
| 13 | Genetics of quantitative traits | Chapter 9, 10 |
| 14 | Genetics of quantitative traits<br>Selection on quantitative traits; Artificial selection/domestication | Chapter 9, 10 |
| 15 | Mapping quantitative traits, GWAS<br>Above the population<br>*Graduate student project due 5PM (21 April)* | Chapter 9, 10 |
| Finals | ***Final exam*** *(date TBD)* | |

**VIII. Additional information**

**Inclusion:** I value the perspectives of individuals from all backgrounds reflecting the diversity of our students. I broadly define diversity to include race, gender identity, national origin, ethnicity, religion, social class, age, sexual orientation, political background, and physical and learning ability. I strive to make this classroom an inclusive space for all students. If you see ways I can improve, please let me know.

I confirm my commitment to the following and encourage you to do so as well:

- Respect the dignity and essential work of all individuals.
- Promote a culture of respect through the university community.
- Respect the privacy, property, and freedom of others.
- Reject bigotry, discrimination, violence, or intimidation of any kind.
- Practice personal and academic integrity and expect it of others.
- Promote diversity of opinions, ideas, and backgrounds, which is the lifeblood of the university.

**Missed classes or exams**: Make-up exams and credit for class attendance will be given only if an absence is pre-arranged or is unexpected due to a university-approved reason for an absence. Acceptable reasons for excused absences include: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, or (e) other circumstances found to fit "reasonable cause for nonattendance" by the professor). In the event of an unexpected absence, a make-up exam or credit for class attendance will be given only if a valid written excuse is provided within one week of the missed class/exam (as per university regulations that are posted at http://www.uky.edu/Ombud). 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. An unexcused absence from a class or exam will result in a zero for that particular class/exam. A missed exam will *not* be dropped from the final grade. Make-up exams will be given immediately following your return. Note to student athletes: You must make arrangements

at least one week in advance, with a note from the athletics department, if you will miss an exam for a sporting event.

**Academic Integrity:** Academic integrity policies have been provided to every student by the university and are available on the internet (http://www.uky.edu/Ombud/acadoffenses/index.htm). Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. If students read this sentence, email the instructor a picture of a cute dog for bonus marks. Students are expected to adhere to university policy on cheating and plagiarism in all courses. Students are encouraged to study together but must take their own exams prepare/give their own presentations. Students caught cheating will automatically fail the class and will be referred to the Academic Ombud and their College Dean.

**Accommodations due to disability**: If you have a documented disability that requires academic accommodations, please see me as soon as possible. To receive accommodations in this course, you must provide a Letter of Accommodation from the Disability Resource Center (https://www.uky.edu/DisabilityResourceCenter/) for coordination of campus disability services available to students with disabilities.

**Class recording notification:** The University of Kentucky Student Code of Conduct defines Invasion of Privacy as using electronic or other devices to make a photographic, audio, or video record of any person without their prior knowledge or consent when such a recording is likely to cause injury or distress. In-person and online meetings of this course may be recorded. All video and audio recordings of lecturers and class meetings, provided by the instructors, are for educational use by students in this class only. They are available only through the Canvas shell for this course and are not to be copied, shared, or redistributed.

As addressed in the Student Code of Conduct, students are expected to follow appropriate university policies and maintain the security of linkblue accounts used to access recorded class materials. Recordings may not be reproduced, shared with those not enrolled in the class, or uploaded to other online environments.

If the instructor or a University of Kentucky office plans any other uses for the recordings, beyond this class, students identifiable in the recordings will be notified to request consent prior to such use. In anticipation of such cases, students may be asked to complete an "authorization of use" form by a faculty member.

Video and audio recordings by students are not permitted during the class unless the student has received prior permission from the instructor. Any sharing, distribution, and or uploading of these recordings outside of the parameters of the class is prohibited. Students with specific recording accommodations approved by the Disability Resource Center should present their official documentation to the instructor.

All content for this course, including handouts, assignments, and lectures are the intellectual property of the instructors and cannot be reproduced or sold without prior permission from the instructors. A student may use the material for reasonable educational and professional purposes extending beyond this class, such as studying for a comprehensive or qualifying examination in a

degree program, preparing for a professional or certification examination, or to assist in fulfilling responsibilities at a job or internship.

## IX. UK BOILERPLATE LANGUAGE

### Midterm Grades for Undergraduate Students (Senate Rules 6.1.3.1)

Midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar.

### Excused Absences (Senate Rules 5.2.5.2.1)

Senate Rules 5.2.5.2.1 defines the following as acceptable reasons for excused absences: 1. significant illness; 2. death of a family member; 3. trips for members of student organizations sponsored by an educational unit, trips for University classes, and trips for participation in intercollegiate athletic events; 4. major religious holidays; 5. interviews for graduate/professional school or full-time employment post-graduation; and 6. other circumstances found to fit "reasonable cause for nonattendance" by the instructor of record. Students should notify the professor of absences prior to class when possible.

If a course syllabus requires specific interactions (e.g., with the instructor or other students), in situations where a student's total EXCUSED absences exceed 1/5 (or 20%) of the required interactions for the course, the student shall have the right to request and receive a "W," or the Instructor of Record may award an "I" for the course if the student declines a "W." (Senate Rules 5.2.5.2.3.1)

If an attendance/interaction policy is not stated in the course syllabus or the policy does not include a penalty to the student, the Instructor cannot penalize the student for any unexcused absences. (Senate Rules 5.2.5.2.3.3)

### Verification of Absences (Senate Rules 5.2.5.2.1)

Students may be asked to verify their absences in order for them to be considered excused. Senate Rule 5.2.5.2.1 states that faculty have the right to request appropriate verification when students claim an excused absence due to: significant illness; death in the household, trips for classes, trips sponsored by an educational unit and trips for participation related to intercollegiate athletic events; and interviews for full-time job opportunities after graduation and interviews for graduate and professional school. (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.)

Programs with learning activities mandated by accreditation or licensure agencies may establish, as a matter of policy, educational consequences for students who have so many excused absences that they cannot complete the mandated learning activities. Pursuant to Senate Rules 6.1.1, the published program policies and individual course syllabi must describe these consequences, which may include the student being moved to a different graduation cohort.

### Religious Observances (Senate Rules 5.2.5.2.1(4))

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. Please

check the course syllabus for the notification requirement. If no requirement is specified, two weeks prior to the absence is reasonable and should not be given any later. Information regarding major religious holidays may be obtained through the Ombud's website or calling 859-257-3737.

**Make-Up Work (Senate Rule 5.2.5.2.2)**
Except where prior notification is required, 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; and for making up the missed work. The instructor must give the student an opportunity to make up the work and/or the exams missed due to the excused absence, and shall do so, if feasible, during the semester in which the absence occurred. The instructor shall provide the student with an opportunity to make up the graded work and may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

For students who add a class after the first day of classes and miss graded work, the instructor shall provide the student with an opportunity to make up the graded work (quiz, exam, homework, etc.). The instructor may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

**Excused Absences and W/I, All Students (Senate Rule 5.2.5.2.3.1)**
If a student has excused absences for more than one-fifth of the required interactions for a course, the student can request a "W." If the student declines a "W," the Instructor of Record may award an "I" for the course.

**Excused Absences Due to Military Duties (Senate Rule 5.2.5.2.3.2)**
If a student must be absent for one-fifth or less of the required course interactions (e.g., class meetings) due to military duties, the following procedure apply:
1. Once a student is aware of a call to duty, the student shall provide a copy of the military orders to the Director of the Veterans Resource Center. The student shall also provide the Director with a list of her/his courses and instructors.
2. The Director will verify the orders with the appropriate military authority and on behalf of the military student, notify each Instructor of Record via Department Letterhead as to the known extent of the absence.
3. The Instructor of Record shall not penalize the student's absence in any way and shall provide accommodations and timeframes so that the student can make up missed assignments, quizzes, and tests in a mutually agreed upon manner.

**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. Visit the DRC website, email the DRC, contact them by phone at (859) 257-2754, or visit their office on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407.

**Non-Discrimination Statement and Title IX Information**
UK is committed to providing a safe learning, living, and working environment for all members of the University community. The University maintains a comprehensive program which protects all members from discrimination, harassment, and sexual misconduct. For complete information about UK's prohibition on discrimination and harassment on aspects such as race, color, ethnic origin, national origin, creed, religion, political belief, sex, and sexual orientation, please see the electronic version of UK's Administrative Regulation 6:1 ("Policy on Discrimination and Harassment") . In accordance with Title IX of the Education Amendments of 1972, the University prohibits discrimination and harassment on the basis of sex in academics, employment, and all of its programs and activities. Sexual misconduct is a form of sexual harassment in which one act is severe enough to create a hostile environment based on sex and is prohibited between members of the University community and shall not be tolerated. For more details, please see the electronic version of Administrative Regulations 6:2 ("Policy and Procedures for Addressing and Resolving Allegations of Sexual Assault, Stalking, Dating Violence, Domestic Violence, and Sexual Exploitation"). Complaints regarding violations of University policies on discrimination, harassment, and sexual misconduct are handled by the Office of Institutional Equity and Equal Opportunity (IEEO), which is located in 13 Main Building and can be reached by phone at (859) 257-8927. You can also visit the IEEO's website.

Faculty members are obligated to forward any report made by a student related to IEEO matters to the Office of Institutional Equity and Equal Opportunity. Students can confidentially report alleged incidences through the Violence Intervention and Prevention Center, Counseling Center, or University Health Services.

**Academic Integrity– Prohibition on Plagiarism (Senate Rules 6.3.1)**
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 on the Academic Ombud page. 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 Rule 6.3.1 (see current 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, except under specific circumstances (e.g. Writing Center review or peer review) allowed by the Instructor of Record or that person's designee. Plagiarism may also include double submission, self-plagiarism, or unauthorized resubmission of one's own work, as defined by the instructor.

Students may discuss assignments among themselves or with an instructor or tutor, except where prohibited by the Instructor of Record (e.g. individual take-home exams). However, the actual work must be done by the student, and the student alone, unless collaboration is allowed by the Instructor of Record (e.g. group projects).

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.

**Academic Integrity – Prohibition on Cheating (Senate Rules 6.3.2)**
Cheating is defined by its general usage. It includes, but is not limited to, the wrongfully 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 fact that a student could not have benefited from an action is not by itself proof that the action does not constitute cheating. Any question of definition shall be referred to the University Appeals Board.

**Academic Integrity – Prohibition on Falsification/Misuse of Academic Records (SR 6.3.3)**
Maintaining the integrity, accuracy, and appropriate privacy of student academic records is an essential administrative function of the University and a basic protection of all students. Accordingly, the actual or attempted falsification, theft, misrepresentation or other alteration or misuse of any official academic record of the University, specifically including knowingly having unauthorized access to such records or the unauthorized disclosure of information contained in such records, is a serious academic offense. As used in this context, "academic record" includes all paper and electronic versions of the partial or complete permanent academic record, all official and unofficial academic transcripts, application documents and admission credentials, and all academic record transaction documents. The minimum sanction for

falsification, including the omission of information, or attempted falsification or other misuse of academic records as described in this section is suspension for one semester.

**ABT 461G**
**Graduate Student Project**

All enrolled graduate students are required to complete an independent project on a population genetics topic of their choosing. Traditionally, this project has been in the form of a ~10-minute presentation. This semester, the format of this project is being expanded to that of a modified "unessay". For an unessay, you choose your own topic, present it any way you please, and you are evaluated on how compelling and effective your product is. On the unimaginative side, this could still be a ~10-minute presentation or ~5-page paper, but more imaginatively, it could be a thoughtful poem, comic book, painting/sculpture, infographic, podcast, etc. My modification to the standard unessay is that you can also use this opportunity to work on developing skills that are useful for your anticipated career (e.g., data analysis, coding, accessing and using publicly available population genetic data).

Here are the general guidelines:

**1. You choose your own topic.** Any topic is fair game for this project, as long as you can associate the topic with the subject matter of the course. **The goal here is let you pursue your own intellectual interests and passions as part of the course, or to work on developing skills that will be useful to your career.** You can take any approach, use as few or as many resources as you wish, and make the topic as broad or as specific as you'd like. The only requirements are that 1) your treatment of the topic be *compelling*, i.e., it needs to be presented in a way that is accurate, interesting, and complete; and 2) it needs to be your own work.

**2. You can present it any way you please.** There are no formal requirements for format of this project. Your unessay can be one page or five pages; if you need to cite something, you can do so in any format you'd like; you can use lists/bullets, write in any tense, use slang; you can present your project in video format, painting, or any other media type; for skill development, you could show me what kinds of skills you've worked on as part of the project (examples below). What is important is that the format and presentation you use helps rather than hinders your argument/presentation of the topic. **Ultimately, I want this project to either expand your intellectual or professional interests or help you develop skills for future use, and the format should facilitate that goal.**

**3. You are evaluated on how compelling and effective you are.** If unessays can be about anything and there are no restrictions on format and presentation, how are they graded? The main criterion is how well it all fits together. i.e., how *compelling* and *effective* your work is towards the goal at the end of the last paragraph. Additionally, of course, whatever you produce needs to be factually accurate and demonstrate your understanding of whatever topic you choose.

In general, an unessay is compelling when it shows some combination of the following:

- it is as interesting as its topic and approach allows.
- it is as complete as its topic and approach allows (it doesn't leave the audience thinking that important points are being skipped over or ignored).
- it is truthful (any questions, evidence, conclusions, or arguments you raise are honestly and accurately presented).

- it makes an argument, taking a particular point of view on the topic. A good unessay doesn't just describe, it synthesizes and analyzes.

With that being said, this is an inherently subjective project, so grading will depend on your chosen topic and format and hopefully how this project will be useful to you in the long run. I will work with each of you to provide guidance for how these projects will be graded. Additionally, your topic and format will need to be approved by me; **a brief (<1/2 page) project proposal is due February 24.** In this proposal, outline what your project topic and presentation format will be and include your rationale for choosing this topic.

**Before the proposal is due, there will be one required group meeting for all the graduate students** where we will discuss and brainstorm potential topic ideas, and perhaps inspire each other in your choices for topics/formats. Date for this meeting is TBD and will be discussed in class. **I will also require one check-in meeting in the second half of the semester after the proposal is due**, just to make sure everyone is on track. Depending on your topic, more 1-on-1 meetings may be required, and I'm happy to meet as often as needed. **Finally, your project is due April 21 by 5 PM (details below).**

**Example topics/formats:**

- Record a ~10-minute video presentation/podcast about an interesting population genetics topic (see below for a not very exhaustive list of random population genetics topics).
- Create visual art depicting various population genetic phenomena.
- Write a song about famous population geneticists.
- Record a debate about the pros and cons of human genetic testing services (23andme, ancestry.com, etc.).
- Create a board game about how population genetics is used in forensics.
- Write a lesson plan for if you were teaching some of these concepts to a high school classroom.
- Write an essay discussing controversial issues in population genetics.
- Prepare a white paper-style document comparing various population genetic data types and their strengths/weaknesses.
- Learn how to process and analyze real-world population genetic data
    - If you're doing a research-based thesis or plan to do hands-on population genetics in your career, learning to deal with standard population genetic data is a must. If you're interested in this avenue, I will work with you to start developing the bioinformatic skills needed to analyze said data (via command line bash/shell scripting and R). Note, this would likely involve many more 1-on-1 meetings, and the final product of this project would be a write-up analyzing a small dataset and summarizing the skills you learned.

**Miscellaneous notes:**

- Does your topic facilitate a group project? Fine with me as long as you check with me and explain that rationale in your proposal. Peer evaluations will be required for any group work.
- Projects can be uploaded to Canvas, if appropriate, or we will make arrangements for how to turn them in.

**Random population genetics topics, to get your brain working:**

- **History and methodology of DNA fingerprinting**. Discussion could include the evolution of methodologies used (including a brief discussion of those methodologies), forensic DNA databases, the choice of loci used in DNA fingerprinting, the effectiveness of methodologies (the power of discrimination and power of exclusion), how the methodology used and sample population affect the power of discrimination and power of exclusion, and the challenge of samples that include DNA mixtures.
- **The evolutionary genetic diversification of humans over the past two million years.** Discussion could include the global expansion of humans across the globe over the past two million years, admixture between "modern" and "archaic" humans, how population genetic analyses contributed to our understanding of this expansion, and how the pattern of expansion contributes to global patterns of genetic diversity of human populations.
- **Forensic genealogy**. A review of methods for inferring distant relationships based on DNA data, including classification accuracy (which is influenced by quality of databases). Basically, what are services such as 23andMe and pet pedigree services doing?
- **Disease carrier genetic screening**. Discuss the history, methodology and efficacy of disease carrier screening in humans or our pets.
- **Genetic mapping of traits/diseases**. Pick your favorite animal or plant, and dig into the genetic stories of various traits
- **Natural selection in human history or on contemporary humans**. Lots of fun evolutionary stories here, e.g., why we can drink milk.
- **Wildlife/botanical forensic population genetics.**
- **Applications of population genetics in conservation biology**. There are many possible topics here (choose one), such as (a) genetic variation in nature, (b) population genetic and evolutionary consequences of habitat fragmentation and/or population bottlenecks, (c) the consequences of loss of genetic variability in natural populations, (d) population genetics of captive populations, (e) evolutionary rescue, (f) genetic diversity and conservation units, (g) managing genetic diversity in threatened species.
- **Management of pesticide resistance**. Discuss the problem of pesticide resistance in insects and how the genetics of resistance (e.g., degree of dominance), population structure, and natural selection interact to affect the rate of resistance evolution, and how we can manage the rate of evolution by manipulating how we grow agricultural plants.
- **Transgene flow**. Discussion of gene flow from agricultural to non-agricultural species, which could include methods for detecting and quantifying gene flow, ecological and evolutionary consequences of transgene flow, and management of transgene flow.
- **Evolution of HIV after infection**.
- **Genetically based pest management strategies** (e.g., genetic leakage of Oxitech GMO mosquitoes in Brazil)
- **Clonal selection in cancer.**
- **Evolution of wildlife/plants in response to harvesting.**

# ABT 480: SPECIAL TOPICS IN AGRICULTURAL AND MEDICAL BIOTECHNOLOGY

## Confocal Laser Scanning Microscopy Principle for Plant Biology

**Semester: Fall 2021**
**Credit Hours: 1**
**Meeting Days/Time/Location: 8-8:50 AM on Tuesday at 452 PSB**

**Instructor:**
Dr. Tomo Kawashima
321 Plant Science Building
Phone: 859-257-2715
E-mail: tomo.k@uky.edu

**Course Description:**
This course is an advanced study of a particular theme or topic in Agricultural and Medical Biotechnology. The student will learn what the confocal laser scanning microscopy (CLSM) is, how it works, and how it is used for plant cell biology research. The student will also review scientific research papers that covers plant biology with confocal microscopy data to further enhance the understanding of confocal microscopy principle for plant biology.

**Prerequisites & Independent Study Contract:**
Consent of instructor.

**Student Learning Outcomes:**
By the time you successfully complete this course, you should be able to:
1. Evaluate how CLSM works.
2. Experiment with the OLYMPUS FV3000 or FV1200 CLSM system.
3. Identify and interpret autofluorescence of plant cells.

**Course Objectives:**
1. Learn how CLSM works through lectures.
2. Review research papers utilizing plant cell confocal microscopy and learn advantages and pitfalls of CLSM in plant cell biology.
3. Experiential training of CLSM using the OLYMPUS FV3000 or FC1200 CLSM system equipped in the Plant Science Building.

**Required Text:**
There is no required text.

**Graded Assignments:**
You will receive a letter grade. This grade will be determined by your timely adherence to a schedule of deliverables developed with your faculty advisor as well as the quality of those deliverables.
Grading Scale: A: 90.00- 100% B: 80.00-89.99% C: 70.00-79.99% D: 60.00-69.99% E: Below 60.00%

| Assignment | Points | Percentages |
|---|---|---|
| **Attendance** | 1 points x 15 | 15% |
| **Q & As at each class** | 3 points x 15 | 45% |
| **Journal club presentation** | 20 points x 2 | 40% |
| **TOTAL** | 100 points | 100% |

## BOILERPLATE LANGUAGE

### Midterm Grades for Undergraduate Students (Senate Rules 6.1.3.1)

Midterm grades will be posted in myUK by the deadline established by the University Senate and published in the Academic Calendar.

### Excused Absences (Senate Rules 5.2.5.2.1)

Senate Rules 5.2.5.2.1 defines the following as acceptable reasons for excused absences: 1. significant illness; 2. death of a family member; 3. trips for members of student organizations sponsored by an educational unit, trips for University classes, and trips for participation in intercollegiate athletic events; 4. major religious holidays; 5. interviews for graduate/professional school or full-time employment post-graduation; and 6. other circumstances found to fit “reasonable cause for nonattendance” by the instructor of record. Students should notify the professor of absences prior to class when possible.

If a course syllabus requires specific interactions (e.g., with the instructor or other students), in situations where a student’s total EXCUSED absences exceed 1/5 (or 20%) of the required interactions for the course, the student shall have the right to request and receive a "W," or the Instructor of Record may award an “I” for the course if the student declines a “W.” (Senate Rules 5.2.5.2.3.1)

If an attendance/interaction policy is not stated in the course syllabus or the policy does not include a penalty to the student, the Instructor cannot penalize the student for any unexcused absences. (Senate Rules 5.2.5.2.3.3)

### Verification of Absences (Senate Rules 5.2.5.2.1)

Students may be asked to verify their absences in order for them to be considered excused. *Senate Rule 5.2.5.2.1* states that faculty have the right to request appropriate verification when students claim an excused absence due to: significant illness; death in the household, trips for classes, trips sponsored by an educational unit and trips for participation related to intercollegiate athletic events; and interviews for full-time job opportunities after graduation and interviews for graduate and professional school. (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.)

Programs with learning activities mandated by accreditation or licensure agencies may establish, as a matter of policy, educational consequences for students who have so many excused absences that they cannot complete the mandated learning activities. Pursuant to Senate Rules 6.1.1, the published

program policies and individual course syllabi must describe these consequences, which may include the student being moved to a different graduation cohort.

## Religious Observances (Senate Rules 5.2.5.2.1(4))

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. Please check the course syllabus for the notification requirement. If no requirement is specified, two weeks prior to the absence is reasonable and should not be given any later. Information regarding major religious holidays may be obtained through the Ombud's website or calling 859-257-3737.

## Make-Up Work (Senate Rule 5.2.5.2.2)

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 instructor must give the student an opportunity to make up the work and/or the exams missed due to the excused absence, and shall do so, if feasible, during the semester in which the absence occurred. The instructor shall provide the student with an opportunity to make up the graded work and may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

For students who add a class after the first day of classes and miss graded work, the instructor shall provide the student with an opportunity to make up the graded work (quiz, exam, homework, etc.). The instructor may not simply calculate the student's grade on the basis of the other course requirements, unless the student agrees in writing.

## Excused Absences and W/I, All Students (Senate Rule 5.2.5.2.3.1)

If a student has excused absences for more than one-fifth of the required interactions for a course, the student can request a "W." If the student declines a "W," the Instructor of Record may award an "I" for the course.

## Excused Absences Due to Military Duties (Senate Rule 5.2.5.2.3.2)

If a student must be absent for one-fifth or less of the required course interactions (e.g., class meetings) due to military duties, the following procedure apply:

1. Once a student is aware of a call to duty, the student shall provide a copy of the military orders to the Director of the Veterans Resource Center. The student shall also provide the Director with a list of her/his courses and instructors.
2. The Director will verify the orders with the appropriate military authority and on behalf of the military student, notify each Instructor of Record via Department Letterhead as to the known extent of the absence.
3. The Instructor of Record shall not penalize the student's absence in any way and shall provide accommodations and timeframes so that the student can make up missed assignments, quizzes, and tests in a mutually agreed upon manner.

## 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. Visit the DRC website, email the DRC, contact them by phone at (859) 257-2754, or visit their office on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407.

## Non-Discrimination Statement and Title IX Information

UK is committed to providing a safe learning, living, and working environment for all members of the University community. The University maintains a comprehensive program which protects all members from discrimination, harassment, and sexual misconduct. For complete information about UK's prohibition on discrimination and harassment on aspects such as race, color, ethnic origin, national origin, creed, religion, political belief, sex, and sexual orientation, please see the electronic version of UK's *Administrative Regulation 6:1* ("Policy on Discrimination and Harassment") . In accordance with Title IX of the Education Amendments of 1972, the University prohibits discrimination and harassment on the basis of sex in academics, employment, and all of its programs and activities. Sexual misconduct is a form of sexual harassment in which one act is severe enough to create a hostile environment based on sex and is prohibited between members of the University community and shall not be tolerated. For more details, please see the electronic version of *Administrative Regulations 6:2* ("Policy and Procedures for Addressing and Resolving Allegations of Sexual Assault, Stalking, Dating Violence, Domestic Violence, and Sexual Exploitation"). Complaints regarding violations of University policies on discrimination, harassment, and sexual misconduct are handled by the Office of Institutional Equity and Equal Opportunity (IEEO), which is located in 13 Main Building and can be reached by phone at (859) 257-8927. You can also visit the IEEO's website.

Faculty members are obligated to forward any report made by a student related to IEEO matters to the Office of Institutional Equity and Equal Opportunity. Students can *confidentially* report alleged incidences through the Violence Intervention and Prevention Center, Counseling Center, or University Health Services.

## Academic Integrity– Prohibition on Plagiarism (Senate Rules 6.3.1)

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 on the Academic Ombud page. 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 Rule 6.3.1* (see current *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, except under specific circumstances (e.g. Writing Center review or peer review) allowed by the Instructor of Record or that person's designee. Plagiarism may also include double submission, self-plagiarism, or unauthorized resubmission of one's own work, as defined by the instructor.

Students may discuss assignments among themselves or with an instructor or tutor, except where prohibited by the Instructor of Record (e.g. individual take-home exams). However, the actual work must be done by the student, and the student alone, unless collaboration is allowed by the Instructor of Record (e.g. group projects).

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.

## Academic Integrity – Prohibition on Cheating (Senate Rules 6.3.2)

Cheating is defined by its general usage. It includes, but is not limited to, the wrongfully 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 fact that a student could not have benefited from an action is not by itself proof that the action does not constitute cheating. Any question of definition shall be referred to the University Appeals Board.

## Academic Integrity – Prohibition on Falsification/Misuse of Academic Records (SR 6.3.3)

Maintaining the integrity, accuracy, and appropriate privacy of student academic records is an essential administrative function of the University and a basic protection of all students. Accordingly,

the actual or attempted falsification, theft, misrepresentation or other alteration or misuse of any official academic record of the University, specifically including knowingly having unauthorized access to such records or the unauthorized disclosure of information contained in such records, is a serious academic offense. As used in this context, "academic record" includes all paper and electronic versions of the partial or complete permanent academic record, all official and unofficial academic transcripts, application documents and admission credentials, and all academic record transaction documents. The minimum sanction for falsification, including the omission of information, or attempted falsification or other misuse of academic records as described in this section is suspension for one semester.

## *Diversity, Equity, and Inclusion*

*The University of Kentucky is committed to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community (Governing Regulations XIV). We acknowledge and respect the seen and unseen diverse identities and experiences of all members of the university community. These identities include but are not limited to those based on race, ethnicity, gender identity and expressions, ideas and perspectives, religious and cultural beliefs, sexual orientation, national origin, age, ability, and socioeconomic status. We are committed to equity and justice and providing a learning and engaging community in which every member is engaged, heard, and valued.*

*We strive to rectify and change behavior that is inconsistent with our principles and commitment to creating a safe, equitable, and anti-racist environment. If students encounter such behavior in a course, they are encouraged to speak with the instructor of record or the college's diversity officer, who is charged with addressing concerns about diversity, equity, and inclusiveness. Students may also contact a faculty member within the department, program director, the director of undergraduate or graduate studies, the department chair, or the dean. To submit an official report of bias, hatred, racism, or identity-based violence, visit the Bias Incident Support Services website.*

# ABT 495-001: EXPERIMENTAL TECHNIQUES IN BIOTECHNOLOGY

Fall Semester 2021 (4 credit hours)
Tuesday or Thursday, 1:00 to 5:00 PM
Room 109 Plant Science Building

Instructors:
**Dr. Luke Moe**, Dept. of Plant and Soil Sciences, 311 Plant Science Building, 859-218-0761 (office), luke.moe@uky.edu. Office hours by appointment.
**Dr. Arthur Hunt**, Dept. of Plant and Soil Sciences, 301A Plant Science Building, 859-218-0776 (office), aghunt00@uky.edu. Office hours by appointment.

Laboratory Assistants:
**Sanjay Joshi:** sanjay.joshi@uky.edu

DESCRIPTION: ABT 495 is a laboratory techniques course designed to give students the technical skills and conceptual understanding necessary to critically examine biological systems at the molecular level. The course will emphasize the principles of molecular biology and biochemistry as applied to a bacterial model system. The course involves lecture and laboratory work, and includes work that must be done outside of class time.

LOGISTICS: This course will be broken down into two "sub-sections". These will be the Tuesday sub-section (TU) and the Thursday sub-section (TH). Students will be assigned to one of the two sub-sections, and will be required to attend class in-person on their designated day (i.e. the TU sub-section attends on Tuesday, the TH sub-section attends on Thursday). We are doing this to limit the number of students in PSB 109 to no more than 10 at a time, and in doing so maintain appropriate social distancing while in the lab. There is an exception to this. For online-only (zoom) meetings, students will be expected to attend virtually on both days of the week (i.e. Tuesday *AND* Thursday). There will be additional work required outside of class to account for limiting attendance to one day per week. The instructor will upload a video lecture (or lectures) to canvas prior to class that students will be required to view prior to coming in for class that week. A detailed protocol will also be uploaded to the canvas page that students should review *and print out* prior to coming in for class. Students are expected to be prepared to begin with their experimental work as soon as class begins. Please note that this syllabus may be subject to change should we be forced to forego in-class instruction. I will keep you informed of any necessary changes.

PREREQUISITE: Introductory Biology series and ABT 360 (Genetics), or consent of instructor.

Students' evaluations will be based on the following criteria:

## 1. Classroom participation (10% of total grade)

This portion of your grade will be based on demonstration of your technical skills, participation in the lab and interaction in classroom and laboratory discussions, and your attendance and the quality of questions you pose at the ABT 395/399 Independent Study Project presentations. These are subjective assessments by Dr. Moe. Note that unexcused absences will count against your classroom participation score.

**2. A variety of written assignments including results, worksheets, homework assignments, and quizzes – in and outside of class (30% of total grade, approximately 2 to 5% per assignment)**

Written assignments will be either in-class assignments or out-of-class assignments. These are not listed on the syllabus calendar. In-class assignments are typically announced at the beginning of the class period. Out-of-class assignments will be assigned through canvas. Students will typically have 3-5 days to complete out-of-class assignments. Unless specifically noted, students are responsible for their own assignments (i.e. these are not "group assignments").

**3. Lab reports (60% of total, 3 reports, 20% each)**

Lab reports comprise the majority of the graded material. Dr. Moe will review lab report information before the first lab report to go over the necessary components of a good lab report. In brief, lab reports should contain 5 sections: Introduction, Methods, Results, Discussion, and References. Additional appendices may be included as well. A title should be included on the first page of the report. Lab reports should be prepared using word processing software (i.e. not hand-written) with a font size of 12, double-spaced, with page numbers included. Reports should be saved as a pdf and uploaded to canvas before the start of the lab period on the day that they are due. Lab reports will be evaluated objectively for accuracy, precision, and completeness, and subjectively for conceptual understanding by Dr. Moe. Lab reports will be scored on a 0-40 scale. An evaluation template is provided below.

*Introduction*: This section should provide a conceptual framework for the work. It should build on previous knowledge of the topic and provide a logical explanation for the reasons this work was undertaken. External literature may be provided to give you background on the topics, and additional readings are encouraged. Why was the work done? What did you expect to discover from the experimental work? Note that you do not need to describe the results that you obtained in the introduction section and this should not be a re-telling of the experiments that you performed.

*Methods*: This section should provide a thorough description of the experiments that you performed. A trained individual should be able to read this section and repeat the experiments to obtain your results. The methods section should be broken down into several sub-headings, with each sub-heading section describing a distinct experimental method (e.g. *catechol dioxygenase assay*, or *RNA purification*). Experiments performed on the same day should not necessarily be part of the same sub-heading. For example, you may perform experiments in one lab session that contribute to both the *catechol dioxygenase assay* and *RNA purification* sections. Text should be written out in paragraph form, not in "bullet point" form, and it is not acceptable to simply copy and paste the text from the laboratory protocols.

*Results*: This section should describe the results of the experiments that you described in the *methods* section—this is where the data goes. The *results* section will consist mostly of figures and tables with their associated captions. You do not need to discuss the results here, but you should note significant observations from the tables/figures. There will be instances where data is not provided in figure/table form. This data should be included in paragraph form.

*Discussion*: This section should include description and interpretation of the data from the *results* section. Does the data from the *results* section allow you to make conclusions? If so, what do you conclude? If not, why is this? You do not need to provide information that has already been described in other sections (e.g. you don't need to describe *how* you obtained the data). A good discussion will compare the results obtained against the expected results, and will reference literature on the topic of note.

*References*: During the course of the semester, readings will be supplied that provide background material. Additional readings may be suggested, and students may find reference material from textbooks, previous coursework, or through their own literature searches. I expect that all referenced material will be included in this section.

## Evaluation template for ABT 495 laboratory reports (40 pts)

Introduction (10 points)

- Is the title included and relevant for the report?
- What are the goals of this set of experiments?
- Is there a hypothesis that is being tested here?
- What background information is necessary to understand the goals?
- What are the methodologies you are using to accomplish your goals?
- What type of information is obtained from the methodologies?
- How do the goals relate to a larger body of scientific work?
- Is the introduction clear, concise, and cohesive?
- Is the introduction of an appropriate length?

Methods (10 points)

- The methods section should be divided logically into different subsections, this is not necessarily based on which day the experiments were performed.
- Each section should be written in clear sentences and paragraphs, not "bullet point" style writing.
- Do not copy and paste information from the lab protocol sheets.
- Could another scientist repeat your experiments and get the same results based solely on your descriptions?

Results (10 points)

- Are all of the appropriate results included?
- Are tables and figures labeled appropriately?
- Do tables and figures have appropriate legends?
- Are clear descriptions of the data included?
- Are the results clearly written and logically organized?

Discussion and references (10 points)

- Is the rationale behind the experiments discussed?
- Are all of the results discussed?
- Can any conclusions be drawn? If so, what are they?

- Are further experiments necessary to draw any conclusions?
- Are the conclusions supported by the data?
- Is conflicting and/or missing data addressed?
- Were difficulties encountered? If so, are they accounted for?
- Is the discussion written clearly and in a logical order?
- Are necessary references and appendices included?

## Course Grading Scale

Grades will be awarded based on the following scale:
A = 90% and above
B = 80%-89%
C = 70%-79%
D = 60%-69%
E = less than 60%

An E without a chance to re-take the class will result from failure due to cheating or plagiarism. If the occasion arises that the scores are significantly lower than expected, I *may* apply a curve to lower the percentages required for each letter grade. I will not curve the class to increase percentages required for each letter grade.

## Readings:

There is no assigned textbook for this course.

The emphasis of this course is on original research, hence assigned and suggested readings will relate largely to primary literature.

Papers relevant to the experiments, the experimental protocols, and parallel studies may be provided with the experimental protocols.

## Course Policies:

Student safety is of the utmost importance in this class. Students are expected to wear lab coats (knee length, long sleeves) and safety goggles at all times in the laboratory. No open-toe shoes are allowed in the lab (e.g. flip-flops, sandals, etc.). Students should wash their hands with soap and water regularly, and prior to leaving the laboratory. Laboratory bench tops are for lab experiments only—not for laptops, cell phones, etc. Students will not wear earphones while in the lab. Students with long hair should wear their hair pulled back to avoid situations in which hair can interfere with benchwork or can catch fire when working with an open flame. Be careful to avoid contaminating personal items (e.g. cell phones, pens, backpacks). Students should wear gloves when conducting benchwork, and remove the gloves when handling personal items. We will follow the mask requirements set forth by the University. As of August 9, 2021, masks are required in all University of Kentucky indoor spaces regardless of vaccination status. This includes the Plant Science Building.

Students are expected to abide by the student code of conduct as described by the office of student affairs (http://www.uky.edu/StudentAffairs/Code/).

Unexcused absences will affect your participation grade and will result in a zero score for any "unannounced" in-class assignments completed or quizzes that are taken during the class period. "Announced" assignments (or lab reports) handed in late will be docked points at a rate of 10% per day (starting immediately after the end of the class period). Lab reports are due at the start of the lab period on their respective due dates.

If you know ahead of time that you will be missing a class period, I strongly encourage you to notify me prior to the day of the class. In the case of excused absences, arrangements may be made to complete any in-class work or quizzes outside of class time.

If you have a documented disability that requires academic accommodations, please notify me as soon as possible. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (Phone (859) 257-2754, e-mail: DRC@uky.edu, website: www.uky.edu/DRC).

If you believe that your assignment, quiz, or report was graded erroneously—or if you discover that a mistake was made adding the total points—it is your responsibility to bring this to my attention *within one week* of the assignment due date, quiz, or report. In reasonable cases, I will be willing to re-grade assignments, quizzes, or exams under these circumstances. Note, however, that I reserve the right to re-grade the entire assignment, quiz, or report. This may result in the final score being the same, higher, or even lower.

Students should not move chairs or barriers in classrooms and should socially distance at all times, leaving a six (6) foot radius from other people. Masks and hand sanitizer can be found in the lab if needed.

Students should leave enough space when entering and exiting a room. Students should not crowd doorways at the beginning or end of class.

Students will be responsible for cleaning/sterilizing their own lab space at the end of each lab period. Cleaning materials will be provided in the lab.

## Academic Honesty:

It is your responsibility to familiarize yourself with the definitions of and sanctions for cheating and plagiarism at the University of Kentucky. Information on plagiarism at the University of Kentucky can be found at the following site: http://www.uky.edu/ombud/plagiarism-what-it.

While I encourage you to work together outside of class, I expect that each individual will be solely responsible for the content of their assignments, quizzes, and reports. It is not acceptable for students to turn in identical answers (or mere re-phrasings of identical answers) for in-class or out-of-class assignments. For group work, I expect equal contribution among group members, and I reserve the right to grade individuals within a group differently if it is apparent that this is not the case. Students may not use the same text or phrasings in their reports.

**Please note that I have electronic copies of reports from previous years and I check lab reports against these to identify plagiarized material.**

**The first cheating/plagiarism infraction will result in zero credit for the assignment/quiz/report. Any second infraction will incur an E (failing) grade for the course.**

Rules governing cheating and plagiarism are in accord with Section VI of the code of student conduct (http://www.uky.edu/StudentAffairs/Code/part2.html).

Cell phones and other electronic devices must be rendered silent during class unless there is a documented reason otherwise.

**UK Policies:**

UK Senate page on academic policy statements:
https://www.uky.edu/universitysenate/acadpolicy

UK Senate page on academic offenses:
https://www.uky.edu/universitysenate/ao

UK Statement on Diversity, Equity, and Inclusion:

*The University of Kentucky is committed to our core values of diversity and inclusion, mutual respect and human dignity, and a sense of community (Governing Regulations XIV). We acknowledge and respect the seen and unseen diverse identities and experiences of all members of the university community (https://www.uky.edu/regs/gr14). These identities include but are not limited to those based on race, ethnicity, gender identity and expressions, ideas and perspectives, religious and cultural beliefs, sexual orientation, national origin, age, ability, and socioeconomic status. We are committed to equity and justice and providing a learning and engaging community in which every member is engaged, heard, and valued.*
*We strive to rectify and change behavior that is inconsistent with our principles and commitment to creating a safe, equitable, and anti-racist environment. If students encounter such behavior in a course, they are encouraged to speak with the instructor of record or the college's diversity officer, who is charged with addressing concerns about diversity, equity, and inclusiveness (uky.edu/inclusiveexcellence/college-diversity-inclusion-officers). Students may also contact a faculty member within the department, program director, the director of undergraduate or graduate studies, the department chair, or the dean. To submit an official report of bias, hatred, racism, or identity-based violence, visit the Bias Incident Support Services website (https://www.uky.edu/biss/report-bias-incident).*

The following links to additional resources available to students, including the Bias Incident Support Services, the UK Counseling Center, the Disability Resource Center, the Martin Luther King Center, the Office of LGBTQ* Resources, the Veterans Resource Center, the Violence Intervention and Prevention Center, and the UK non-discrimination and Title IX policy.
https://www.uky.edu/universitysenate/student-resources

ABT 495 Fall semester 2021 calendar:

Experiments are color coded according to the module under which they fall. Lab report due dates are listed in red text. Lab reports will be due at the beginning of class (1PM) on the day that you attend class (i.e. on Tuesday of the specified week for the TU sub-section, on Thursday for the TH sub-section)

Module 1: green shading
Module 2: blue shading
Module 3: orange shading

| Week | In-lab work |
|---|---|
| **Week 1**<br>Aug 23-27 | • Purify *Pseudomonas putida* mt-2 genomic DNA from liquid cultures<br>• PCR amplify *xylE* gene from *P. putida* mt-2 genomic DNA (2 reactions)<br>• Miniprep pET28b plasmid from liquid cultures |
| **Week 2**<br>Aug 30-Sep 3 | • Run agarose gel on *xylE* PCRs<br>• Purify remaining DNA from PCRs<br>• NheI/BamHI restriction enzyme digests of PCR and pET28b<br>• Clean digests, determine DNA concentration, ligate *xylE* with pET28b |
| **Week 3**<br>Sep 6-10 | • **Sep 6 (Mon) is labor day**<br>• **No class this week**<br>• *TAs will transform ligations into E. coli DH5α and start liquid cultures for next week* |
| **Week 4**<br>Sep 13-17 | • Miniprep plasmid DNA from cultures<br>• Run NheI/BamHI restriction enzyme digest on miniprepped DNA<br>• Run agarose gel on digests to identify plasmids with *xylE* insert<br>• Send plasmid DNA for sequencing to verify *xylE* insert |
| **Week 5**<br>Sep 20-24 | • Prepare *E. coli* BL21(DE3) competent cells<br>• Transform pETmt2CDO plasmid into *E. coli* BL21(DE3) cells<br>• Prepare for overexpression of *xylE* gene and CDO protein purification<br>• Make SDS-PAGE gels and store at 4°C<br>• *TAs will inoculate liquid cultures in preparation for xylE gene overexpression* |
| **Week 6**<br>Sep 27-Oct 1 | • Induce *xylE* gene expression in liquid cultures<br>• Take "pre-induction" and "harvest" cell samples, store at -20°C<br>• Harvest induced cells and store at -80°C<br>• Run Bradford BSA protein standard assays<br>• **LAB REPORT 1 IS DUE** |
| **Week 7**<br>Oct 4-8 | • Lyse cells and purify CDO protein using Nickel-NTA resin<br>• Run Bradford assays to determine protein concentration<br>• Pool purified CDO protein and store CDO aliquots at -80°C |
| **Week 8**<br>Oct 11-15 | • SDS-PAGE analysis of protein purification samples<br>• Run preliminary CDO enzyme assays |
| **Week 9**<br>Oct 18-22 | • Perform CDO enzyme kinetics assays<br>• Prepare liquid growth medium for module 3 work |
| **Week 10**<br>Oct 25-29 | • **Oct 25-26 (Mon/Tues) is Fall break**<br>• **No class this week unless you need to finish enzyme kinetics (only on Thurs)**<br>• *TAs will inoculate cultures for next week* |

| | |
|---|---|
| **Week 11**<br>Nov 1-5 | • Run CDO assays of *P. putida* mt-2 lysate from cells grown with different carbon sources<br>• Prepare for *P. putida* mt-2 cultures and RNA purification<br>• *TAs will inoculate cultures for next week in preparation for RNA purification* |
| **Week 12**<br>Nov 8-12 | • Purify RNA from *P. putida* mt-2 cultures grown with different carbon sources<br>• Check RNA quality by agarose gel, determine RNA concentration<br>• Run reverse transcription reaction to generate cDNA from RNA<br>• **LAB REPORT 2 IS DUE** |
| **Week 13**<br>Nov 15-19 | • Prepare RNA-seq libraries<br>• *TAs will finish RNA-seq libraries if necessary and send off for sequencing* |
| **Week 14**<br>Nov 22-26 | • **Nov 24-26 (Wed thru Fri) is Thanksgiving holiday**<br>• **Open week** |
| **Week 15**<br>Nov 29-Dec 3 | • Perform RNA-seq data analysis<br>• **Students will attend class both days (Tues *and* Thurs) this week** |
| **Week 16**<br>Dec 6-10 | • **All students will attend Tues class this week**<br>• Perform RNA-seq data analysis |
| **Week 17**<br>Dec 13-17 | • **No class this week**<br>• **LAB REPORT 3 IS DUE** |

# BSAMB - Agricultural and Medical Biotechnology - CHANGE

**Change DEGREE Program**

## Change Degree Program

Access to Resources, Including Curriculum Workbooks

**Upload #2 (Letters)**

**Convert individual files to PDF format, combine them, and upload a single PDF.**

**Emails/letters/minutes Documenting Approval for Borrowed Courses (if relevant)**

- **Correspondence regarding borrowed courses must include specific course prefix(es) and number(s).**

**Letters of Support from Affected Departments (if relevant)**
**Letters of Support from Additional Units (if relevant)**

**Upload #3 (OSPIE files)**

**Convert the file to PDF format and upload a single PDF.**

**Revised curriculum map (if relevant)**

**Upload #4 (Other)**

**Not all proposals will include the items listed below and there may be additional documents you would like to upload with your proposal. Include in "Upload #4 (Other)" the documents that do not fit into one of the three categories above.**

**Convert individual files to PDF format, combine them, and upload a single PDF.**

**Student Surveys (if relevant)**
**Benchmark Data (if relevant)**
**Job Market Surveys (if relevant)**

**Action (If this field is blank after importing, type "CHANGE.")*** CHANGE

**Is this program clinical? Also select "Yes" if the program is not clinical but you wish for the program to be reviewed by the HCCC.*** ○ Yes ◉ No

## 1. General Information

**1a. Degree level*** ◉ Undergraduate ○ Graduate

**1b. Check all boxes describing the types of changes being requested.***

- [x] Required courses
- [x] Elective courses
- [x] Total required credit hours
- [ ] Student learning outcomes
- [ ] Major name
- [ ] Criteria for admissions/progression/termination
- [ ] Add track (undergraduate), concentration (master's), or specialization (doctoral)
- [ ] Change track (undergraduate), concentration (master's), or specialization (doctoral)
- [ ] Other (includes changes to GCCR)

**1c. College*** College of Ag, Food and Environment (81010)

**1d. Home Educational Unit (department, school, college):*** Agriculture General (CM81010)

**1e. CIP code:*** 26.1201

**1f. Current Degree (BA, BFA, etc.):*** BSAMB

**1g. Proposed degree:*** BSAMB

**1h. Current major name (Biology, Design, etc.):*** Agricultural and Medical Biotechnology

**1i. Proposed major name:*** Agricultural and Medical Biotechnology

**1j. Will there be any changes regarding a track, concentration, or specialization for the program?*** ○ Yes ◉ No

**Kentucky's Council on Postsecondary Education (CPE) has official terms that describe focused areas of study, specifically "track" (at the undergraduate level), "concentration" (at the master's level) and "specialization" (at the doctoral level). In SAP, these are all referred to as "options."**

**1k. Accrediting agency, if applicable:*** NA

**1l. Requested effective date:***

- [x] Fall semester following approval, OR
- [ ] Specific fall semester (if selected, provide the year of the fall semester below)

**Specific year's fall semester:**

**1m. Contact person name:*** Robert Hirsch

**1n. Email:** * rlhi227@uky.edu

## 2. Overview of Changes

**2a. Provide a rationale and brief description of the changes and, if applicable, include the date and results of the most recent external or periodic program review.***

The degree changes in this proposal are in response to a doubling of student enrollment in the last six years, in addition to updating the graduation requirements based on increased major change and transfer students from diverse programs into AMBT. The new curriculum proposed here will streamline the delivery of the AMBT curriculum based on previous internal and external curricular changes, increase student satisfaction by facilitating the development of an academic cohort for students who join the program after their first year, help scaffold students for success in their required independent research project, codify course equivalencies that are currently granted on an ad hoc basis, and decrease the graduation credit requirement to 120.

1. **Addition of a degree-required course ABT 310 to introduce transfer students into the program.** AMBT loses approximately 30-40% of admitted freshmen after four semesters due to the rigor of the curriculum but gains a concomitant population back from other majors at UK and transfers. These new, mid-career AMBT students do not currently receive any formal orientation to the program compared to students who take ABT 101 and 120 their freshmen year. This new course and equivalency to ABT 101 seeks to remedy this discrepancy.
2. **Addition of a degree-required course ABT 394 to help students identify research mentors and prepare for their required research experience (ABT 395).** Enrollment in the program and competition for undergraduate research opportunities has increased since the establishment of ABT over 20 years ago, and our students will be well served with additional curricular scaffolding to help support their integration into a research lab.
3. **Drop BIO 155 as a pre-major requirement.** The content and foci of BIO 155 has changed since the establishment of this requirement, and the course no longer offers a practical biological lab experience (i.e., “wet lab”). The major-required course ABT 120 has evolved to cover similar content from the original iteration of BIO 155, so the students will receive the same training with this course deduction.
4. **Change ABT 395 and ABT 399 from variable credit courses to a 3-credit courses.** ABT 396 was established six years ago to allow students increased flexibility in their credit-bearing research experiences, so we would like to switch the flexibility of a variable credit research class from a major-required course (ABT 395/399) to our specialty support category (ABT 396). This change will also standardize the required research experience for all students.
5. **Add the following equivalencies for existing pre-major courses: CHE 105 = CHE 109/110, PHY 211 = PHY 231/241, PHY 213 = PHY 232/242, STA 296/ BST 230 = STA 381, STA 570, STA 580, and BCH 401G = CHE 550.** The program enrollment has approximately doubled over the last six years, and we continue to attach an increasingly diverse student body from major changes and transfers. These changes codify equivalencies that we have granted on an ad hoc basis for several years, mainly pertaining to students who enroll in the program from the College of Engineering.
6. **Reduce the Elective requirement from 7-10 to 2-5, bringing the program in line with the 120 credit hour degree expectations (currently at 125).** A majority of our students enroll in ABT with several general education credits from their pre-UK studies (e.g., AP, duel-enrollment, community college), and no

longer utilize the elective credit requirement as originally intended. So, we do not anticipate a scenario where this reduction in elective credit will impact the quality of a student's academic process.

**2b. If the total hours required for graduation have changed, describe the changes and provide a rationale.***

We are proposing to reduce the total hours required for graduation from 125 to 120. A majority of our students enroll in ABT with several general education credits from their pre-college studies (e.g., AP, dual-enrollment, community college), and no longer utilize the elective credit requirement as originally intended. So, we do not anticipate a scenario where this reduction in elective credit will impact the quality of a student's academic process or alter, in any way, their degree progress.

**2c. Will the requested change(s) result in the use of courses from another educational unit?***

○ Yes ◉ No

**If "Yes," list the courses and identify the other units that have approved the inclusion of their courses.***

NA

**2d. Will the changes being proposed for the degree program involve changes to student learning outcomes?***

○ Yes ◉ No

**If "Yes," list the current student learning outcomes and the proposed student learning outcomes, and also provide a rationale for the changes.***

NA

**2e. If this proposal is for a bachelor's degree, will the proposed change(s) affect an associated minor?***

○ Yes
◉ No
○ Not Applicable

**If "Yes," the department must also submit a change form to change the minor.**

**2f. If this proposal is for a bachelor's degree, will the GCCR be fulfilled differently?***

○ Yes
◉ No
○ Not Applicable

**If "Yes," BRIEFLY describe the proposed changes.***

NA

| | | |
|---|---|---|
| **2g. Regarding delivery method, are there associated changes to the program's curriculum (i.e. adding distance learning delivery to courses) that would allow the program to be delivered 100% via distance learning?** * | ○ Yes | ◉ No |

**If "Yes," consider emailing UK Distance Learning for additional guidance.**

| | | | |
|---|---|---|---|
| **If "Yes," will the on-campus program still be offered?** * | ○ Yes | ○ No | ◉ Not applicable |

| | |
|---|---|
| **2h. Are there any changes to the degree not already described here or in the Curriculum Workbook?** * | No. |

## Do Not Use

| | |
|---|---|
| **Do Not Use** | |
| **Do Not Use** * | |

# Steps for BSAMB - Agricultural and Medical Biotechnology - CHANGE

## Originator

Status: *Approved*

### Participants

Robert Hirsch 2/21/2022 1:31 PM

### Activity

**Required Participation:**
***100% required***
**Required for Approval:**
***100% required***
**Date Completed:**
***2/21/2022 131 PM***
**Changes:** ***No***
**Comments:** ***No***

## Dept/School/Pgm-Level Approval

Status: *Approved*

### Participants

Carmen Agouridis 2/28/2022 5:05 PM

### Activity

**Required Participation:**
***100% required***
**Required for Approval:**
***100% required***
**Date Completed:**
***2/28/2022 505 PM***
**Changes:** ***Yes***
**Comments:** ***Yes***

## College-Level Approval

Status: *Approved*

### Participants

Carmen Agouridis 2/28/2022 5:12 PM

### Activity

**Required Participation:**
***100% required***
**Required for Approval:**
***100% required***
**Date Completed:**
***2/28/2022 512 PM***
**Changes:** ***No***
**Comments:** ***Yes***

## Undergraduate Council

Status: *Working*

### Participants

▲ **Undergraduate Council**

Ann Eads *

### Activity

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Time Spent:** ***38 days***
**Changes:** ***No***
**Comments:** ***No***
**Agenda:** ***Yes***

*** Agenda Administrator***

## Senate Council (SC) Office

Status: *Incomplete*

### Participants

Sheila Brothers

Ann Eads

### Step Details

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Work:** ***edit, comment***

## Senate Transmittal (No Cmte Review)

Status: *Incomplete*

### Participants

▲ **Senate Transmittal**

Sheila Brothers *

### Step Details

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Work:** ***edit, comment***
**Agenda:** ***Yes***

*** Agenda Administrator***

## SC (After Sent to Cmte)

Status: *Incomplete*

### Participants

▲ **Senate Council (SC) Representative**

Sheila Brothers *

### Step Details

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Work:** ***edit, comment***
**Agenda:** ***Yes***

*** Agenda Administrator***

## Senate (After Sent to Cmte)

Status: *Incomplete*

### Participants

▲ **University Senate Representative**

Sheila Brothers *

### Step Details

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Work:** ***edit, comment***
**Agenda:** ***Yes***

*** Agenda Administrator***

## OSPIE

Status: *Incomplete*

### Participants

RaeAnne Pearson

### Step Details

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Work:** ***comment***

## Registrar

Status: *Incomplete*

### Participants

Nathan Congleton

Matthew Patterson

### Step Details

**Required Participation:** ***100% required***
**Required for Approval:** ***100% required***
**Work:** ***comment***

# Attachments for BSAMB - Agricultural and Medical Biotechnology - CHANGE

**OSPIE Substantive Change Decision Email.pdf** (uploaded by Carmen Agouridis, 2/22/2022 1:53 pm) **AMBT 4 year plan 2022 major change 2.28.22.pdf** (uploaded by Carmen Agouridis, 2/28/2022 5:03 pm) **Bachelor of Science in Agricultural and Medical Biotechnology 02.25.2022.xlsx** (uploaded by Carmen Agouridis, 2/28/2022 5:03 pm)

# Comments for BSAMB - Agricultural and Medical Biotechnology - CHANGE

**Carmen Agouridis** — 2/28/2022 5:12 pm

This proposal was approved by the college's undergraduate curriculum committee.

**Curriculog** — 2/28/2022 5:12 pm

Carmen Agouridis has approved this proposal on College-Level Approval.

**Carmen Agouridis** — 2/28/2022 5:05 pm

This proposal was approved by the college's undergraduate curriculum committee.

**Curriculog** — 2/28/2022 5:05 pm

Carmen Agouridis has approved this proposal on Dept/School/Pgm-Level Approval.

**Curriculog** — 2/21/2022 1:31 pm

Robert Hirsch has approved this proposal on Originator.

**Curriculog** — 2/21/2022 9:33 am

Robert Hirsch has launched this proposal.

**Curriculog** — 2/21/2022 9:27 am

Robert Hirsch imported from the map uk_program_majors into the following proposal fields: Change Degree Program: Action (If this field is blank after importing, type "CHANGE."), 1. General Information: 1a. Degree level, 1. General Information: 1c. College, 1. General Information: 1d. Home Educational Unit (department, school, college):, 1. General Information: 1e. CIP code:, 1. General Information: 1f. Current Degree (BA, BFA, etc.):, 1. General Information: 1h. Current major name (Biology, Design, etc.):, Do Not Use: Do Not Use.

# Signatures for BSAMB - Agricultural and Medical Biotechnology - CHANGE

There are no signatures required on this proposal.

# Crosslistings for BSAMB - Agricultural and Medical Biotechnology - CHANGE

**BSAMB - Agricultural and Medical Biotechnology - CHANGE (parent proposal)**

**This proposal does not have any active crosslisted proposals.**

# Decision Summary for BSAMB - Agricultural and Medical Biotechnology - CHANGE

## Undergraduate Council

Status: *Working*

### Step Summary

**This step requires 100% approval from all participants to move forward.**

| Participants | Totals |
| --- | --- |
| ▲ **Undergraduate Council** | **Users Approved:** ***0*** |
| **Ann Eads *** | **Users Rejected:** ***0*** |

# Program-level Student Learning Outcomes Assessment Plan

Academic Degree Programs
University of Kentucky

## INSTRUCTIONS

The faculty of each academic program, degree or certificate, are asked to complete this plan template during the 2019-20 academic year to guide assessment of the program-level student learning outcomes (PSLOs) during the upcoming cycle. Assessment plans are due to the Office of Strategic Planning & Institutional Effectiveness (OSPIE) no later than **April 15, 2020** and should be submitted to the appropriate college and program folder in SharePoint.

A Quick Start Guide and other documentation as well as dates for live training sessions are provided on the OSPIE website. Training resources and session topics range from an overview of the new assessment process to principles and practice for student learning outcome assessment. Questions can be directed to OSPIE staff.

*Reading the Quick Start Guide prior to completing the new plan template is strongly encouraged.*

## ABOUT THE PROGRAM

College or School (*example: College of Arts & Sciences*) College of Agriculture, Food and Environment

Degree Type (*example: BA or MS*) BS

Program Name (*example: History*) Agricultural and Medical Biotechnology

Please provide the mission statement for the program. If one does not currently exist, provide the department or college mission statement.

The College of Agriculture, Food and Environment ***serves the people*** of the Commonwealth and across the world through education, outreach, service, and research by finding solutions to improve lives today and creating a sustainable future.

We do this by:

- educating current and future leaders
- producing and disseminating knowledge through creative research and discovery
- promoting lifelong learning and strengthening Kentucky communities through applied knowledge

(Optional) Include any additional information about the program's history, development, or structure that may be beneficial in understanding the curriculum and how student learning is assessed.

The Agricultural and Medical Biotechnology program is an interdisciplinary, genetics-based research program that has consistently produced strong and qualified graduates over it's 25 year history. Furthermore, since 2015 the program has experienced a nearly two-fold increase in enrollment while maintaining it's high standards of academic rigor, robust academic and professional advising, and scholarly discourse.

## ASSESSMENT CYCLE

All programs that do not have specialized accreditation and are not located in a department/college with a specialized accreditation should follow a 4-year PSLO assessment cycle. Programs that have specialized accreditation(s) or are within a college that has a comprehensive accreditation can develop an alternate PSLO and periodic review cycle in consultation with OSPIE.

Which cycle will the program being using?

☒ 4-year cycle [What does this look like?]

☐ Other (accredited programs/departments only)

If the program has selected "other" for the assessment and periodic review cycle, please append a copy of the proposed cycle and a brief justification to this plan.

## ASSESSMENT COORDINATION AND RESOURCES

Individual(s) coordinating program-level student learning outcomes assessment

| First and Last Name | Title/Position | Email |
|---|---|---|
| Robert Hirsch | Lecturer and Director of Undergrad. Studies | Robert.hirsch@uky.edu |
| | | |
| | | |

Other individuals providing oversight, coordination, or support for assessment

| First and Last Name | Title/Position |
|---|---|
| Luke Moe | Assoc. Prof., Steering Committee Chair |

| | |
|---|---|
| Esther Fleming | Academic Coordinator |
| | |

(Optional) Other utilized resources for assessment (e.g. software such as rubrics or portfolios, evaluator stipends, etc.)

| |
|---|
| An analytical rubric to assess student development of assessment of written and oral presentation artifacts from their second to fourth year in the program. |

## PROGRAM-LEVEL STUDENT LEARNING OUTCOMES

Please list the program-level student learning outcomes (PSLOs). If applicable, indicate which, if any, outcomes are required by your specialized accreditor(s) [What is this?]. Bachelor's degree programs must also indicate which outcome(s) map to the university's GCCR (Graduation Composition & Communication Requirement). The GCCR is not a requirement for certificates, graduate, or professional programs.

Space for up to 10 PSLOs has been provided below, but this does not imply that 10 outcomes are required. Program faculty should decide the appropriate number based on the design of the curriculum. Most programs have 3-8 outcomes, depending on the length of the program. If more than 10 lines are needed, either insert more lines into the table or submit a request to OSPIE@uky.edu for a template with additional lines for PSLOs.

| PSLO # | Program-level Student Learning Outcome Statement (How should these be written?) | Required by Specialized Accreditor(s)? | Mapped to GCCR? (Undg degrees only) |
|---|---|---|---|
| *Example* | *Graduates will be able to critically evaluate scientific literature related to drugs and disease to enhance clinical decision-making.* | ☐ | ☐ |
| 1 | Acquire knowledge about the range of approaches to manipulate and improve plants, animals and microorganisms | ☐ | ☒ |
| 2 | Demonstrate the ability to develop, interpret and critically evaluate modern approaches to scientific investigation | ☐ | ☒ |
| 3 | Evaluate how their experience in the program has influenced their outlook on the relationship between society and biotechnology, and how their personal philosophies and values have been influenced as a consequence of the program. | ☐ | ☒ |

| PSLO # | Program-level Student Learning Outcome Statement (How should these be written?) | Required by Specialized Accreditor(s)? | Mapped to GCCR? (Undg degrees only) |
|---|---|---|---|
| 4 | Participate in research projects including the requirements of the independent study course ABT 395 or experiential learning course ABT 399 and demonstrate oral and written science communication. | ☐ | ☒ |
| 5 | | ☐ | ☐ |
| 6 | | ☐ | ☐ |
| 7 | | ☐ | ☐ |
| 8 | | ☐ | ☐ |
| 9 | | ☐ | ☐ |
| 10 | | ☐ | ☐ |

Please provide a brief description of the process used to develop or revise current PSLOs and the extent to which program faculty were involved. If applicable, provide discussion of any attempts to align PSLOs with professional or accreditation standards, employer expectations and job skills, graduate program curricula, etc. If PSLOs are taken directly from an accreditor, discuss whether (and how) the PSLO statements were reviewed by the faculty to ensure they were comprehensive.

The PSLOs were developed nearly two decades ago during the conception of the Agricultural and Medical Biotechnology program, and the faculty and steering committee of the program believe that they still serve the students well. Therefore, the PSLOs are unchanged from previous assessment periods.

## CURRICULUM MAP

Please create a map of the PSLOs to the curriculum. All required courses should be included in the left-hand column, and all PSLOs should span across the remaining columns. If desired, specific elective courses or elective "tracks" can be included (recommended). The purpose of the curriculum map is to show where each PSLO is emphasized within the curriculum. The level at which each PSLO is taught within a given course should be indicated as follows: introductory (I); reinforced (R); or mastery (M). Each PSLO should have at least an instance of I, R, and M across the curriculum, with the exception of certain graduate programs where introductory knowledge is provided at the undergraduate level. For assistance in developing a curriculum map, please visit the OSPIE website or contact the OSPIE team.

| Course | PSLO1 | PSLO2 | PSLO3 | PSLO4 | PSLO5 | PSLO6 | PSLO7 | PSLO8 | PSLO9 | PSLO10 |
|---|---|---|---|---|---|---|---|---|---|---|
| ABT 101 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 120 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 201 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 301 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 395/399 | M | M | M | M | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 460 | M | M | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 461 | M | M | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ABT 495 or BIO 510 | M | M | M | M | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| BCH 401G | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Bio 208 or 308 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| Bio 209 or 309 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| ENT/ABT 360 or BIO 304 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| BEST 230 or STA 296 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| BIO 148 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| BIO 152 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| BIO 155 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 105 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 107 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 111 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 113 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 230 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 231 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CHE 232 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| CHE 233 | R | R | R | R | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| PHY 211 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| PHY 213 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| MAT 113 or MAT 120 or MAT 137 | I | I | I | I | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |
| | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. | Choose an item. |

I = Introduced; indicates that students are introduced to the outcome
R = Reinforced and opportunity to practice; indicates the outcome is reinforced and students afforded opportunities to practice
M = Mastery at the senior or exit level; indicates that students have had sufficient practice and can now demonstrate mastery

## ASSESSMENTS

Please complete the chart below by listing each assessment on a separate row, and including the requested information. Except for outcomes that focus on students' values or beliefs, at least 1 assessment should be direct. Ideally, all outcomes should have at least 2 assessments. If available, append a copy of the assessment measure/instrument (e.g. scoring rubric or sample questions) to this report. If a goal/target has already been set or can be set for a given measure/instrument, this should be included in the table. Otherwise, the program will need to determine and specify a target/goal when results are first reported for that instrument/measure. Note: space for only 15 instruments/measures have been provided. If space for additional assessment instruments/measures are needed, either insert additional rows into the table or contact OSPIE staff to receive a customized template with additional lines.

| Assessment Instrument/ Measure Name | PSLO(s) Mapped to | Assessment Type (Direct or Indirect) | Assessment Instrument/Measure Description (What is this?) | Assessment Instrument/Measure Rationale (What is this?) | Benchmark or Goal (If Available) (What is this?) | Course(s) (If applicable) | Rubric or Example Appended? |
|---|---|---|---|---|---|---|---|
| *ABT 201 final paper* | *1,2,3,4* | *Direct* | *Students complete the final paper individually on a relevant & timely topic related to program assessment. Papers are scored by the course instructor and members of the program steering committee using a standard analytical rubric developed by members of the program for PSLO assessments. Due to the size of the course, the instructor will randomly select five papers from each semester for assessment totally 10 papers for each academic year (see attached rubric).* | *Measure was chosen because it provides evidence of student achievement at the beginning of the program (consistent for initially enrolled students and transfer students who all must take ABT 201) and multiple criteria on rubric align directly to PSLOs. Program administration recently (2020) reviewed assignment instructions, rubric, and samples of student work to ensure good alignment with outcomes. Multiple evaluators will be used to score a sample of student work and estimate reliability (interrater agreement) of the rubric.* | *The average student assessment score will equal 3 or better on each criterion (on a 5-point scale)* | *ABT 201* | ☒ |
| *ABT 395 research symposium presentation* | *1,2,3,4* | *Direct* | *Students complete the research symposium presentation following the conclusion of their research internship experience. Oral presentations are scored by the course instructor, members of the program steering committee, and program faculty using a standard analytical rubric developed by members of the program for PSLO assessments and for ABT 201. All students (typically 15-20) are assessed each semester (see attached rubric).* | *Measure was chosen because it provides evidence of student achievement at the end (or near the end) of the program as the embodiment of their performance as an independent scientist, and multiple criteria on rubric align directly to PSLOs. Program administration recently (2020) reviewed assignment instructions, rubric, and samples of student work to ensure good alignment with outcomes. Multiple evaluators will be used to score student work and estimate reliability (interrater agreement) of the rubric.* | *The average student assessment score will equal 4 or better on each criterion (on a 5-point scale)* | *ABT 395* | ☒ |

## ASSESSMENT REPORTING CYCLE

Please complete the chart below by providing the requested information for each learning outcome. Note: space for up to 10 PSLOs has been provided. If space for additional PSLOs are needed, either insert additional rows into the table or contact the OSPIE staff to receive a customized template.

| PSLO # | Semester/ Year(s) Data Collected | Year(s) Results Submitted to OSPIE (see Results Report Definition) | Year(s) Reflection Report Submitted to OSPIE (see Reflection Report Definition) | Year(s) Action Report Submitted to OSPIE (see Action Report Definition) |
|---|---|---|---|---|
| *Example* | *Fall / 2020* | *Summer 2021* | *Summer 2023* | *Summer 2024* |
| 1 | Academic year 2020-2021 | Summer 2021 | Summer 2023 | Summer 2024 |
| 2 | Academic year 2020-2021 | Summer 2021 | Summer 2023 | Summer 2024 |
| 3 | Academic year 2021-2022 | Summer 2022 | Summer 2024 | Summer 2025 |
| 4 | Academic year 2021-2022 | Summer 2022 | Summer 2024 | Summer 2025 |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |

## FEEDBACK AND SUPPORT ON PSLO ASSESSMENT PLAN

Each program has the option of receiving formative feedback on its new or revised PSLO assessment plan from OSPIE staff members. OSPIE staff can provide suggestions for improvement to learning outcome statements, overall assessment plan design, curriculum mapping, standard setting, individual assessment tools, etc. If your program would like to receive feedback on its assessment plan, please indicate below:

☒ Yes, we would like to receive feedback.

☐ No thank you, not at this time.

If there are questions the program director or faculty did not have the opportunity to ask prior to submission of the PSLO assessment plan, and you would like to schedule a brief consultation with OSPIE staff, please indicate below:

☐ Yes, we would like to schedule an individual or group consultation.

☒ No thank you, not at this time.

Please see the new PLSO analytical assessment rubric utilized for the AMBI program. Previously, a similar holistic rubric was utilized, however this tool is more functional, informative, and will increase consistency across assessors. Furthermore, previous OSPIE reviews suggested that our assessment criteria were too lax (i.e., students routinely scored in the upper 10% of the assessment criteria), therefor more specific differentiation was provided between the medium and excellent criteria to allow faculty to more accurately and consistently differentiate acceptable achievement from exceptional achievement. In summary, while this assessment strategy is similar in practice to previous iterations, the improved assessment tool will allow us to more rigorously assess our students and will increase the expectations for our students to strive toward.

| **Criteria** | **Deficient** | **Low** | **Medium** | **High** | **Excellent** |
|---|---|---|---|---|---|
| Score | 1 | 2 | 3 | 4 | 5 |
| SLO 1: Acquire knowledge about the range of approaches to manipulate and improve plants, animals and microorganisms | Provides incorrect examples, without acknowledging no or limited understanding of the content | Acknowledges no or limited understanding of the content | Provides a curricular (i.e., textbook) level of understanding. Does not know overarching ideas, but can suggest specific topics or examples before or after the topic | Explains the placement of the content and can justify the placement. Can identify some of the overarching ideas | Elaborates on the content before and after the topic. Knows why the content fits where it does and why it is important. Can identify overarching themes associated with the content area. |
| SLO 2: Demonstrate the ability to develop, interpret and critically evaluate modern approaches to scientific investigation | Does not present an adequate array of scholarly ideas and fails to consider multiple points of view | Does not engage successfully with scholarly conversation in the subject area, and considers multiple viewpoints and ideas tentatively or overstates the conflict. | Engages in limited scholarly conversation but is unaware of critical information, and is familiar with one viewpoint, idea, or conflict. | Engages in scholarly conversation through inter-textual means and integrates multiple viewpoints and compares ideas or perspectives. | Engages in scholarly conversation and defends an original perspective using inter-textual means, and critiques the context of the scholarly discourse in terms of the student's assumptions |

| | | | | | |
|---|---|---|---|---|---|
| SLO 3: Evaluate how their experience in the program has influenced their outlook on the relationship between society and biotechnology, and how their personal philosophies and values have been influenced as a consequence of the program. | Does not provide evidence of introspection or personal growth as a result of participation in the program | Provides some vague examples of introspection or personal growth that has arisen during the program | Provides some examples of introspection or personal growth that has arisen during the program | Provides some general examples of introspection and personal growth that has arisen during the program | Provides clear examples of introspection and personal growth that has arisen through participation in the program |
| SLO 4: Participate in research projects including the requirements of the independent study course ABT 395 or experiential learning course ABT 399 and demonstrate oral and written science communication. | Products contain many errors in grammar and formatting, and lack cohesive structure requiring major edits and revisions. | Products contain a moderate amount of grammar and formatting errors, but lacks cohesive structure requiring major edits and revisions. | Products contain a moderate amount of grammar and formatting errors, and the structure can be improved with editing and revision | Products contain little or no errors in grammar and formatting but contain less than professional-level organization and delivery | Products contain little or no errors in grammar and formatting, and exemplify professional-level organization and delivery |

# Program-level Student Learning Outcomes Results Report

Academic Degree Programs
University of Kentucky

## INSTRUCTIONS

The faculty of each academic program, degree or certificate, are asked to complete this report template during the 2020-21 academic year to provide the results obtained during the first year of the new program-level student learning outcomes (PSLOs) assessment cycle. These results reports are due to the Office of Strategic Planning & Institutional Effectiveness (OSPIE) by **July 1, 2021**, unless an *earlier* deadline has been set by the college dean, and should be submitted to the appropriate program folder in SharePoint.

Instructional guides, videos, and other materials are available in the SharePoint site to help guide you. You can also reach out to the OSPIE staff with questions or to schedule a consultation.

## ABOUT THE PROGRAM

College or School (*example: College of Arts & Sciences)* College of Agriculture, Food and Environment

Department (if applicable) NA

Degree Type (*example: BA, MS, Graduate Certificate)* BS

Program Name (*example: History)* Agricultural and Medical Biotechnology

## CONTACT INFORMATION

Individual(s) who completed this report

| First and Last Name | Title/Position | Email |
|---|---|---|
| Robert Louis Hirsch | Lecturer, Director of Undergraduate Studies | Robert.hirsch@uky.edu |
| | | |
| | | |

## PROGRAM-LEVEL STUDENT LEARNING OUTCOMES

Please list all program-level student learning outcomes (PSLOs) for the program in the table below. These can be copied and pasted directly from the program's 2019-20 PSLO assessment plan if one was submitted. Any outcomes that were revised after the 2019-20 PSLO plan was submitted should be indicated by clicking the checkbox in the row for that outcome. Additionally, any parts that were revised should be bolded or highlighted. Note: all PSLOs for the program should be included in the table below, not just those that were assessed in 2020-21. For most programs, approximately half of the PSLOs should have been assessed in 2020-21 but will depend upon the program's 2019-20 PSLO plan.

Space for up to 12 PSLOs has been provided below, but this does not imply that the program is expected to have 12 outcomes. The program may delete any unnecessary outcome lines or insert additional rows if needed.

| PSLO # | Program-level Student Learning Outcome Statement (How should these be written?) | Assessed in 2020-21? | Revised Since 2019-20 PSLO Plan? |
|---|---|---|---|
| *Example* | *Graduates will be able to critically evaluate scientific literature related to drugs and disease to enhance clinical decision-making.* | ☒ | ☐ |
| 1 | Acquire knowledge about the range of approaches to manipulate and improve plants, animals and microorganisms | ☒ | ☐ |
| 2 | Demonstrate the ability to develop, interpret and critically evaluate modern approaches to scientific investigation | ☒ | ☐ |
| 3 | Evaluate how their experience in the program has influenced their outlook on the relationship between society and biotechnology, and how their personal philosophies and values have been influenced as a consequence of the program. | ☐ | ☐ |
| 4 | Participate in research projects including the requirements of the independent study course ABT 395 or experiential learning course ABT 399 and demonstrate oral and written science communication | ☐ | ☐ |
| 5 | | ☐ | ☐ |
| 6 | | ☐ | ☐ |

## ASSESSMENT MEASURES

Complete the table below by listing each measure used for the PSLOs that were assessed during 20-21. If the program filed a PSLO plan with OSPIE in 19-20, most of the information needed for this table can be copied and pasted from the plan. Please check the PSLO SharePoint site to determine whether the program has a plan on file and refer to it as needed. Note: only the PSLOs assessed in 20-21 and the measures used to assess those outcomes need to be listed in the table. **If no PSLO plan is on file for 19-20, program-level student learning outcomes will need to be developed or updated, as needed, from an earlier assessment plan or program proposal and measures to assess those outcomes created and listed below.**

*Instructions*

1. Enter each measure on a separate row. Each measure only needs to be listed once, even if it is used to assess multiple PSLOs.
2. In column 2, provide a name for the measure.
3. In column 3, enter the corresponding number(s) for the PSLO(s) listed in the table above on p.2-3 that the measure was used to assess.
4. If the program submitted a PSLO plan in 19-20 (verify here):
    a. If the faculty/staff do not wish to make any changes to the measure's description, rationale, or benchmark, click the checkbox in column 4 indicating no changes made. Move on to the next measure; no additional information is needed for this measure.
    b. If the faculty/staff wish to change one or more of the following: description, rationale, and/or benchmark for the measure, do not select the checkbox in column 4. Next, enter new information ONLY for the aspects of the measure being revised in columns 5-7. For example, if only the description is being updated, there is no need to enter a rationale or benchmark.
5. If the program did not submit a plan in 19-20, do not select the checkbox in column 4. Enter all requested information for the measure: description, rationale, and benchmark

# Program-level Student Learning Outcomes Results Report

Academic Degree Programs
University of Kentucky

| *Column 1* | *Column 2* | *Column 3* | *Column 4* | *Column 5* | *Column 6* | *Column 7* |
|---|---|---|---|---|---|---|
| Measure # | Assessment Instrument/ Measure Name | PSLO(s) Mapped to Measure | Measure Description, Rationale, & Benchmark Same as 19-20 Plan? | New Assessment Instrument/Measure Description (What is this?) (complete only if description changed from 19-20 or if 19-20 plan not submitted) | New Assessment Instrument/Measure Rationale (What is this?) (complete only if rationale changed from 19-20 or if 19-20 plan not submitted) | New Benchmark or Goal (If Available) (What is this?) (complete only if benchmark changed from 19-20 or if 19-20 plan not submitted) |
| *1* | *ABT 201 final paper* | *1,2,3,4* | ☒ | | | |
| 1 | *ABT 395 research symposium presentation* | 1,2,3,4 | ☒ | | | |
| 2 | | | ☐ | | | |
| 3 | | | ☐ | | | |
| 4 | | | ☐ | | | |

## ASSESSMENT RESULTS

Please complete the chart below by providing the requested information for each measure. The order of the measures should be the same as the Measures Table in the previous section so that numbering is consistent. Note: space for up to 12 measures has been provided. If space for additional measures is needed, either insert additional rows into the table or contact the OSPIE staff to receive a customized template. The program may delete any extra rows that are not needed.

| Measure # | Semester/ Year(s) Data Collected | Total Students Assessed | Sampling Strategy or All Students Assessed (What is this?) | Scoring Process (What is this?) | Summary of Results (What should be included here?) | Benchmark (What is this?) | Name of Appendices with Tables or Figs of Results (Optional) |
|---|---|---|---|---|---|---|---|
| *1* | *Fall / 2020 Spring / 2021* | *10 (pooled from 2 sections)* | *Students complete the final paper individually on a relevant & timely topic related to program assessment. Due to the size of the course, the instructor will randomly select five papers from each semester for assessment totally 10 papers for each academic year (see attached rubric).* | *Papers are scored by the course instructor and members of the program steering committee using a standard analytical rubric developed by members of the program for PSLO assessments* | *The means and standard deviations for the applicable rubric criteria are:*<br><br>*PSLO1: 4.1 +/- 0.8*<br>*PSLO2: 3.5 +/- 0.9*<br><br>*This shows that, on average, students performed better on the criterion aligned with PSLO1 than the criterion aligned with PSLO2, but exceeded the minimum expectations outlined in the assessment plan.* | *Fully Met:* ☒<br>*Partially Met:* ☐<br>*Not Met:* ☐<br>N/A: ☐ | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | *Fall / 2020*<br>*Spring / 2021* | 22 | *All students (typically 15-20) are assessed each semester .* | *Students complete the research symposium presentation following the conclusion of their research internship experience. Oral presentations are scored by the course instructor, members of the program steering committee, and program faculty using a standard analytical rubric developed by members of the program for PSLO assessments and for ABT 201* | *The means and standard deviations for the applicable rubric criteria are:*<br><br>*PSLO1: 4.2 +/- 0.7*<br>*PSLO2: 4.1 +/- 0.6*<br><br>*This shows that, on average, students performed slightly better on the criterion aligned with PSLO1 than the criterion aligned with PSLO2, but exceeded the minimum expectations outlined in the assessment plan. Also, these data indicate a consistent improvement over the course of matriculation* | Fully Met: ☒<br>Partially Met: ☐<br>Not Met: ☐<br>N/A: ☐ | |
| 2 | | | | | | Fully Met: ☐<br>Partially Met: ☐<br>Not Met: ☐<br>N/A: ☐ | |
| 3 | | | | | | Fully Met: ☐<br>Partially Met: ☐<br>Not Met: ☐<br>N/A: ☐ | |

## (OPTIONAL) NOTES TO GUIDE FUTURE REFLECTION

This section provides an opportunity to, optionally, provide an initial reflection and interpretation of the PSLO results and process or potential next steps. The full reflection report will be submitted in Year 3 (22-23), unless the program is following an agreed-upon custom cycle to align with its specialized accreditor. Although not required, this space could be helpful for guiding any initial departmental conversations around the PSLO data and process as well as providing continuity to a new program director, DGS, or DUS.

*The results for this year indicate student performance was at or above the benchmark for all PSLOs assessed (PSLO 1 and 2 at both timepoints). Student achievement was borderline on the two terminal measures (mean scores of 4.1 and 4.2 compared to a target of 4.0), although students showed clear improvement between the two assessment periods. These data are difficult to interpret within our program's history due to the programmatic adaptations required because of the COVID-19 pandemic, which limited (or outright banned) student involvement in research (and therefor fundamentally altered their research experience and subsequent presentation). While we aspire that upper-level students scoring closer to 5.0 in their 395 research symposia, we will continue monitoring these scores in the next two years as our "experiential" education component shifts back to in-person research and the data more accurately assess our curriculum.*

## FEEDBACK AND SUPPORT ON PSLO RESULTS REPORT

Each program has the option of receiving formative feedback on its PSLO assessment report from OSPIE staff members. If your program would like to receive feedback on its assessment report, please indicate below:

☒ Yes, we would like to receive feedback.

☐ No thank you, not at this time.

# CAFE faculty honored for teaching, service

*CAFE faculty award winners include from top left: Kenny Burdine and Liz Combs and bottom from left: Ken Haynes and Lou Hirsch.*

*November 23, 2020*

Lexington, Ky.

Four faculty members of the University of Kentucky College of Agriculture, Food and Environment were honored for their contributions to the college's research, teaching and extension efforts. The annual awards were presented during the college's fall faculty meeting.

The recipients of this year's Master Teacher awards are Liz Combs, Department of Dietetics and Human Nutrition, and Lou Hirsch, Department of Plant Pathology. The annual award recognizes outstanding teaching including effectiveness in the classroom, dedication to students through activities in and out of the classroom, and evidence of activity to improve teaching.

Combs has served for nine years as the director of the coordinated program in dietetics while also teaching several classes each semester and advising undergraduate students. She is a creative, energetic and passionate educator who consistently receives positive feedback from her students.

This year, the pandemic hit during students' dietetic internships, and Combs, along with others, quickly strategized and navigated a path for the dietetic interns to complete their internships in a timely manner to be eligible to take the registered dietitian exam. Their innovative approach to completing the internship included collaborating with Family and Consumer Sciences Extension on a project that has since been accepted as a peer-reviewed professional journal publication.

Hirsch has provided instruction to undergraduates in agricultural and medical biotechnology and plant pathology for five years and is widely recognized as an exceptional instructor. He serves as the director of undergraduate studies for the AMBT program as well as for individualized programs within the college.

This year, Hirsch has been an exceptional leader in adapting teaching techniques to the unforeseen challenges of the pandemic. He recently co-authored a publication in Experiential 2 Learning & Teaching in Higher Education titled, "What to do When the Lab Closes? Managing an Interdisciplinary, Undergraduate Research Capstone Course During a Global Pandemic."

Ken Haynes, professor in the Department of Entomology, received the George E. Mitchell Jr. Award for Outstanding Service to Graduate Students. The award is given each year in honor of Mitchell, who was a well-regarded graduate student advisor and mentor. Haynes, a faculty member for 35 years, has served on over 86 graduate committees. He is currently the director of graduate studies for entomology, and in the past year, he took on the substantial task of redeveloping the department's program student learning outcomes plans.

Also, since the onset of the COVID-19 pandemic, Haynes' wisdom, empathy and accessibility have helped bring a sense of connection and normalcy to graduate students, helping them to remain productive while also ensuring their mental well-being and emotional health.

Kenny Burdine, Department of Agricultural Economics, received the Mack Whiteker Award given by the Kentucky Association of State Extension Professionals in honor of CAFE alumnus McElwyn "Mack" Whiteker.

KASEP recognized Burdine earlier this year, and he was recognized again along with the other recipients. He was honored for his excellent work in the field of agriculture economics extension, particularly livestock marketing strategies, market outlook and price risk management.

**Contact:** Brian Lee, **blee@uky.edu (mailto:blee@uky.edu)**

**News Topics:**
**Crops (/crops)**, **Economics (/economics)**, **Entomology (/entomology)**, **Extension (/extension)**, **Family Consumer Sciences (/family-consumer-sciences)**, **Food Science (/food-science)**, **Nutrition (/nutrition)**, **Research (/research)**

**Professional News (/professional-news)**

# UK Honors Outstanding Advisors Fleming, Rintamaa With Freedman Award

**By Gail Hairston (/authors/gail-hairston)** March 2, 2018

Esther Fleming and Margaret Rintamaa (l to r)

**LEXINGTON, Ky. (March 2, 2018) —** The University of Kentucky has honored two of its most exceptional advisors with the Freedman Outstanding Advising Award. The University of Kentucky Advising Network (https://www.uky.edu/advisors/node/2061) and the Freedman Selection Committee selected Margaret Rintamaa (https://education.uky.edu/fac/margaret-rintamaa/) as the recipient of the outstanding faculty advisor award and Esther Fleming (https://abt.ca.uky.edu/person/esther-fleming) as the recipient of the outstanding professional advisor award.

Academic advising is integral to fulfilling the teaching and learning mission of higher education. Through academic advising, students learn to become members of their higher education community, to think critically about their roles and responsibilities as students, and to prepare to be educated citizens of a democratic society and a global community.

Rintamaa is an associate professor in the Department of Curriculum and Instruction in the College of Education (https://education.uky.edu/edc/). She earned her doctoral degree at UK with an emphasis on mentoring beginning teachers and the Kentucky Teacher Internship Program.

“Dr. Rintamaa is an outstanding advisor, and she knows the middle level program curriculum like the back of her hand! She can always answer any question we might possibly have over anything we could possibly have questions over,” said student nominator Erin McMurry.

On a personal note, McMurry added, “I had a rough start to the middle level program, and Dr. Rintamaa sort of took me under her wing and helped me get back on track. She always takes the time to make sure I am doing okay, and I do not think I would still be in this program if it were not for her.”

"Dr. Rintamaa has been a supporting force for me since I returned to college," said Colin Inman, who re-enrolled in college a year ago. "Being a nontraditional student and someone who has to support himself while in school, Dr. Rintamaa has been nothing but understanding and accommodating to my situation. I recently have made major life changes, and Dr. Rintamaa continues to encourage me and let me know how excited she is that I am on the path I am now."

"She has made my experience at UK one of comfort," Inman continued. "She has allowed me to reassure myself that I have made the correct decision with my schooling. I want to be the best teacher I can be not only for myself, my future students, but also for Dr. Rintamaa."

In the College of Agriculture, Food and Environment's Agricultural and Medical Biotechnology program (https://abt.ca.uky.edu/home) (fondly known as ABT), students often follow a well-worn, circuitous path on the second floor of Ag North — down the center hall lined with freezers, right at the end of the hall, through the door marked "Equine office, Natural Resource and Environmental Science and Agricultural Biotechnology," down the left hall to the office marked "J." There, students find Esther Fleming, the woman many consider the savior of their academic life at UK.

"Esther is the first person you meet when you join the agricultural biotechnology (ABT) major. She knows every student by name, not an easy task in a major that is constantly growing. She's there for every club meeting, every poster session and every award, always taking pictures and getting a statement for her weekly newsletter," said student nominator Adrienne Arnold.

"Two years ago, when I presented at UK's undergraduate (research) poster session," continued Arnold, "she rode her bike across campus in the rain to make sure that she was able to hear every ABT students' presentation and take pictures of them for her newsletter. She is the friendly face of outreach that makes our major feel small and supportive. Our program would not be the same without her."

"Before I even started classes," said student nominator Kate Cox, "she took the time to sit down with me, and discuss some of my initial, ambitious plans. To this day, I use the plan every semester to keep myself on track. A friendly and approachable mentor, she will point each student in the right direction based on their goals. Her honesty and sincerity have helped me make the right choices in what to study while at UK. Thanks to her expertise about ABT, I have been able to balance hard science classes with a wildly different minor, dance."

The recipients of the Freedman Award will receive a $500 travel grant from UK Student and Academic Support, a unit of the UK Division of Student and Academic Life. The advisor award is named for Ken Freedman, who served as a professional advisor at UK for 15 years prior to his death in 2001. Freedman was one of the founders of the UK Advising Network in 1986 and instrumental in advising leadership on campus in the 1990s.

View a list of past recipients (https://www.uky.edu/advisors/ken-freedman-awards) on the Advising Network website.

*UK is the University for Kentucky. At UK, we are educating more students, treating more patients with complex illnesses and conducting more research and service than at any time in our 150-year history. To read more about the UK story and how you can support continued investment in your university and the Commonwealth, go to: uky.edu/uk4ku*

*(http://www.uky.edu/uk4ky). #uk4ky #seeblue*

**Professional News (/professional-news)**

# Two UK Advisors Honored at NACADA Region 3 Conference

**By Rebecca Longo (/authors/rebecca-longo)** April 18, 2019

**LEXINGTON, Ky. (April 18, 2019) —** Two University of Kentucky advisors have received awards from the National Academic Advising Association (NACADA) (https://www.nacada.ksu.edu/).

Esther Fleming (https://abt.ca.uky.edu/person/esther-fleming), academic coordinator for the Agricultural and Medical Biotechnology program (http://abt.ca.uky.edu/) in the College of Agriculture, Food and Environment (https://www.ca.uky.edu/), was awarded the NACADA Region 3 Excellence in Advising Award for 2019. And Jennifer Stevens (http://cph.uky.edu/people/jennifer-stevens), academic advisor in the College of Public Health (http://cph.uky.edu/), was awarded the "Best of Region" award for her presentation "Flipping out for Generation Z."

Fleming was recognized by the UK Advising Network last academic year as the recipient of the 2018 Ken Freedman Outstanding Professional Advisor Award (https://www.uky.edu/advisors/ken-freedman-awards) and was subsequently nominated for the NACADA Region 3 Excellence in Advising Award.

"I am humbled, honored, surprised and excited to receive the NACADA region 3 Excellence in Advising – Advisor Primary Role award," Fleming said. "I certainly appreciate the nominations my advisees submitted and the letters of reference my colleagues submitted on my behalf for this award. The biggest impact of this award was realizing how the influences of my own personal mentors and life's experiences worked together to culminate in winning this award."

NACADA's "Best in Region" award is the highest honor the region can bestow on a presenter. Only one person from each of the 10 regions receives this award. With being named "Best in Region," Stevens is automatically accepted as a presenter and will receive recognition for her achievements at the 2019 annual conference (https://www.nacada.ksu.edu/Events/Annual-Conference/Upcoming-Annual-Conferences.aspx) this October in Louisville, Kentucky.

"I applied to present at the NACADA Region 3 conference because of my experience attending other NACADA conferences," Stevens said. "In fact, it was at a NACADA conference that I discovered the concept of flipped advising, the topic of my presentation. After going through the process of building a Canvas course for my advisees, I knew that I could present information to colleagues that could be useful in their advising practice. It is exciting that my peers thought the presentation was valuable enough to merit this award."

Region 3 (https://www.nacada.ksu.edu/Community/Regions/Region-3.aspx) of NACADA is made up of universities in Kentucky, North Carolina, South Carolina, Tennessee and West Virginia. Each of the 10 regions are governed by elected officers who propose a variety of activities to support academic advisors, faculty advisors and advising administrators within their geographic region.

Twelve members of the UK faculty and staff proudly represented the university at the NACADA Region 3 Conference March 18-20, in Charleston, West Virginia.

NACADA: The Global Community for Academic Advising was chartered as a nonprofit organization in 1979 to promote quality academic advising and professional development of its membership to ensure the educational development of students. Since that beginning, NACADA has grown to 11,000 members consisting of faculty members, professional advisors, administrators, counselors and others in academic and student affairs concerned with the intellectual, personal and vocational needs of students. In addition, NACADA is the representative and advocate of academic advising and those providing that service to higher education. The UK Advising Network became an institutional member of NACADA in 2018. For more information, visit NACADA's website at www.nacada.ksu.edu (http://www.nacada.ksu.edu/).

# McNear, Hirsch named UK Great Teachers

*L to R: Darshak Patel, Anna Voskrensensky, Emily Cunningham, Taunya Phillips, David McNear, Martha Riddell, Lou Hirsch, Michael Huang. Phillips and Huang are with the UK Alumni Association. Mark Cornelison | UK Photo.*

*March 4, 2020 | By: Gail Hairston, Kody Kiser, Amy Jones-Timoney and Steve Shaffer*

Lexington, Ky.

What makes a good teacher a great one? University of Kentucky students were eager to share their opinions about the best teacher in their lives, nominating them for one of the most esteemed awards on campus.

The UK Alumni Association 2020 Great Teacher Award was recently bestowed upon six University of Kentucky educators. Initiated in 1961, UK's Great Teacher Award is the longest-running UK award recognizing teaching. In order to receive the award, educators must first be nominated by a student. The UK Alumni Association Great Teacher Award Committee, in cooperation with the student organization Omicron Delta Kappa, then makes the final selection. Recipients receive an engraved plaque and stipend.

UK's 2020 Great Teachers are:

**Emily Cunningham (https://ukhealthcare.uky.edu/doctors/emily-cunningham) —** College of Medicine: Obstetrics and Gynecology

**Robert Lou Hirsch (https://abt.ca.uky.edu/person/dr-lou-hirsch) —** College of Agriculture, Food and Environment: Plant Pathology

**David McNear (http://pss.ca.uky.edu/person/dave-mcnear) —** College Agriculture, Food and the Environment: Plant and Soil Sciences

**Darshak Patel (http://gatton.uky.edu/faculty-research/faculty/patel-darshak) —** Gatton College of Business and Economics: Economics

**Martha Riddell (https://cph.uky.edu/news/riddell-receives-great-teacher-award-alumni-association) —** College of Public Health: Health Management and Policy

**Anna V. Voskresensky (https://mcl.as.uky.edu/users/avvosk2) —** College of Arts and Sciences: Modern and Classical Languages, Literature and Culture

The 2020 Great Teachers were honored last night at the UK Alumni Association Great Teacher Award Recognition Dinner at the Hyatt Regency in Lexington. Each received a $4,000 stipend, and they were recognized during the Tennessee vs. Kentucky men's basketball game that evening.

Learn more about the 2020 Great Teachers based on comments from their nominators:

**Emily Cunningham (https://med.uky.edu/users/eecu224)**

In addition to her "vast knowledge" of obstetrics and gynecology fields, UK Family Medicine resident Alex Wade nominated Cunningham because "she is an innovator. She created multiple puzzles and patient scenarios to put students in the role of the physician, which helped to establish fundamental knowledge in a fun and engaging way. Before starting the rotation, she walks students through basic knowledge and then creates opportunities for students to teach each other. (She) sets up pop-up didactics, Socratic talks, Head-Up learning games, OB/GYN Family Feud and OB/GYN Pictionary. She has helped to develop an educational website for medical students and residents that is an encompassing location for a multitude of resources and educational videos. No professor in my academic career put as much effort into teaching and creating new models for learning as Dr. Cunningham. Her passion for treating patients and for the advancement of knowledge was infectious," said Wade.

**Robert Lou Hirsch (https://abt.ca.uky.edu/person/dr-lou-hirsch)**

"If a student ever asked a question (Hirsch) could not answer, he always made note to research the question and respond to the class within a few days. In class, and even now, I know that if I ask Dr. Hirsch something, he will know or will find out quickly," explained Katelyn Cox, an agricultural and medical biotechnology senior who nominated Hirsch. But beyond his knowledge of the subject matter, "Hirsch is an animated, energetic lecturer who always keeps students laughing and learning. I remember he often used memes and other pop culture references in his lectures to help students learn and to be more relatable to students. (He) lectures in an improvisational, personable manner that allows him to easily adapt to the needs of the classroom.  I could not think of any other professor who does so much for his students while balancing so many other simultaneous responsibilities."

**David McNear (http://pss.ca.uky.edu/person/dave-mcnear)**

One of the reasons graduate student Rebecca McGrail nominated McNear is due to his ability to teach students "from a variety of academic backgrounds including landscape architecture, agricultural education, biosystems engineering, environmental sciences and soil science. The diversity of majors in (his) class can be a challenge. He has met with the program directors for both landscape architecture and agricultural education to review the class structure and expectations so that he may better serve these programs. His commitment to ensuring students of all backgrounds succeed in his course is unparalleled. (McNear) is up front with students and encourages them to join study groups to complete the learning objectives as the course progresses. (He) is committed to UK's students and is involved directly in student advising. He is able to assist students in making resolute connections between their course work and employment possibilities. This is critical for students to be qualified for many job opportunities," McGrail said.

**Darshak Patel (http://gatton.uky.edu/faculty-research/faculty/patel-darshak)**

UK finance and accounting senior Andy Flood traveled to Australia to attend an economics class taught by Patel and is making plans to register this fall for Sports Economics, another class taught by Patel. Patel "is incredibly well-versed in world economics and makes a valiant effort to be approachable not only to his current students, but past students as well as people who have never taken one of his classes. (Patel) grew up in Kenya, was raised in an Indian family and went to British high school, so he brings a fresh worldly experience that not all professors have the ability to contribute to the classroom experience," said Flood. "He brings real-world experiences, industry-leading speakers, and other outside aids into the classroom in a way that makes learning more interesting and

hands-on for all students. Since economics is found in all aspects of the world, he pushes boundaries to create avenues for learning that extend beyond the traditional classroom walls and provide lasting educational experiences."

**Martha Riddell (https://cph.uky.edu/news/riddell-receives-great-teacher-award-alumni-association)**

UK graduate student in health administration and physician assistant studies Majd Jabbour said, Riddell "has a special way of relaying information in class that isn't like any other I have experienced. She has broad knowledge in health management and public health. She engrained in us the qualities and skills required of a future healthcare leader. Her lectures are discussion-based and interactive in a way that makes students feel as if there isn't a lecture taking place. Her charisma and method of teaching reflect a deep understanding, a person who has experienced what she preaches and not just reading off slides. I have rarely witnessed such caring, kindness and sincerity in advising and guiding. Priority goes to her students and they are always welcomed. She is always the first to arrive and the last to leave the college. She is truly a guardian of her students' future. UK is very lucky to have her."

**Anna V. Voskresensky (https://mcl.as.uky.edu/users/avvosk2)**

A native Russian speaker, Voskresensky "is a very innovative and creative teacher" with "tremendous expertise in all things relating to Russian culture, literature and language," said nominator Garrison Wright, a junior majoring in Russian studies. "One of her most important projects is a class in which students read and discuss excerpts from Russian literature on UK's student radio station WRFL. To my knowledge, this is the only academic class that uses WRFL, as well as the only Russian-language broadcast in Central Kentucky. (She) invites students to her home to eat home-cooked Russian dinners and watch Russian films. She is extremely concerned with forming personal relationships with each of her pupils, in order to help them achieve their fullest potential. (She) is a faculty adviser to the UK Russian Club and is highly involved with the organization's planning and execution of programs. She collaborates with professors from the other language departments and from the UK School of Music to host annual poetry/piano recital events."

The UK Alumni Association is committed to fostering lifelong engagement among alumni, friends, the association and the university. For more information about the UK Alumni Association, visit **www.ukalumni.net (http://www.ukalumni.net/)** or call 800-269-2586.

**Contact:** Gail Hairston, **gail.hairston@uky.edu (mailto:gail.hairston@uky.edu)**, 859-257-3302

**News Topics:**
**Awards (https://news.ca.uky.edu/awards)**, **Crops (https://news.ca.uky.edu/crops)**, **Extension (https://news.ca.uky.edu/extension)**, **Research (https://news.ca.uky.edu/research)**

**ABT Research Mentors**

**Mentors (n = 239) listed by year and affiliation**

| **2016** | College | Department | Other affiliation |
|---|---|---|---|
| Martin Nielsen | CAFE | Veterinary Science | |
| Aardra Kachroo | CAFE | Plant Pathology | |
| William Stoops | Medicine | Behavioral Science | |
| Michael Flythe | CAFE | Animal and Food Sciences | |
| Dan Howe | CAFE | Veterinary Science | |
| Bruce Webb | CAFE | Entomology | |
| Olga Tsyusko | CAFE | Plant and Soil Sciences | |
| Catherine Linnen | Arts and Sciences | Biology | |
| Keiko Tanaka | CAFE | Community and Leadership Development | |
| Robin Cooper | Arts and Sciences | Biology | |
| Linda Dwoskin | Pharmacy | Pharmaceutical Sciences | |
| Seth DeBolt | CAFE | Horticulture | |
| Art Hunt | CAFE | Plant and Soil Sciences | |
| Rebecca Dutch | Medicine | Molecular and Cellular Biochemistry | |
| Bruce Webb | CAFE | Entomology | |
| Steven Estus | Medicine | Physiology | |
| Hunter Moseley | Medicine | Molecular and Cellular Biochemistry | |
| Lisa Vaillancourt | CAFE | Plant Pathology | |
| Melinda Wilson | Medicine | Physiology | |
| Michael Goodin | CAFE | Plant Pathology | |
| David Hildebrand | CAFE | Plant and Soil Sciences | |
| Lisa Vaillancourt | CAFE | Plant Pathology | |
| Bjoern Bauer | Pharmacy | Pharmaceutical Sciences | |
| Beth Garvy | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Marcielle DeBeer | Medicine | Physiology | |
| Steven Van Lanen | Pharmacy | Pharmaceutical Sciences | |
| Lisa Vaillancourt | CAFE | Plant Pathology | |

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|---|---|---|---|
| David Horohov | CAFE | Veterinary Science | |
| Eric Rush | | | University of Nebraska |

| **2017** | College | Department | Other affiliation |
|---|---|---|---|
| Kathy Graves | CAFE | Veterinary Science | |
| Kathleen Franklin | | | ParaTechs |
| Sharyn Perry | CAFE | Plant and Soil Sciences | |
| John D'Orazio | Medicine | Pediatrics | |
| David Horohov | CAFE | Veterinary Science | |
| Sharyn Perry | CAFE | Plant and Soil Sciences | |
| Yvonne Fondufe-Mittendorf | Medicine | Molecular and Cellular Biochemistry | |
| Stephanie Olivier-Van Stichelen | | | NIH |
| Yvonne Fondufe-Mittendorf | Medicine | Molecular and Cellular Biochemistry | |
| Beth Garvy | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Amanda Adams | CAFE | Veterinary Science | |
| Yvonne Fondufe-Mittendorf | Medicine | Molecular and Cellular Biochemistry | |
| Michael Goodin | CAFE | Plant Pathology | |
| James Matthews | CAFE | Animal and Food Sciences | |
| Udeni Balasuriya | CAFE | Veterinary Science | |
| Czarena Crofcheck | CAFE | Biosystems and Agricultural Engineering | |
| Philip Gribble | Health Sciences | Athletic Training and Clinical Nutrition | |
| Clare Rittschoff | CAFE | Entomology | |
| Subba Reddy Palli | CAFE | Entomology | |
| Luke Moe | CAFE | Plant and Soil Sciences | |
| Lisa Vaillancourt | CAFE | Plant Pathology | |
| Edmund Rucker | Arts and Sciences | Biology | |
| Robert Houtz | CAFE | Horticulture | |
| Annette Gilchrist | | | Midwestern University |
| Robin Cooper | Arts and Sciences | Biology | |

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|---|---|---|---|
| Nancy Webb | Medicine | Pharmacology and Nutritional Sciences | |
| Matthew Gentry | Medicine | Molecular and Cellular Biochemistry | |
| Ai-Ling Lin | Medicine | Pharmacology and Nutritional Sciences | |
| Rebecca Dutch | Medicine | Molecular and Cellular Biochemistry | |
| Elizabeth Autry | Pharmacy | Pharmacy Practice | |
| Marcielle DeBeer | Medicine | Physiology | |
| Sarandeep Huja | | | MUSC college of Dentistry |
| David Hildebrand | CAFE | Plant and Soil Sciences | |
| Dan Howe | CAFE | Veterinary Science | |

| **2018** | College | Department | Other affiliation |
|---|---|---|---|
| Emily Pfeufer | CAFE | Plant Pathology | |
| Cynthia Gaskill | CAFE | Veterinary Science | |
| Kevin Pearson | Medicine | Pharmacology and Nutritional Sciences | |
| Steve Estus | Medicine | Physiology | |
| Seth DeBolt | CAFE | Horticulture | |
| Subba Reddy Palli | CAFE | Entomology | |
| Peter Nelson | Medicine | Pathology and Laboratory Medicine | |
| Michael Mendenhall | Medicine | Molecular and Cellular Biochemistry | |
| Luke Bradley | Medicine | Neuroscience | |
| Jason Unrine | CAFE | Plant and Soil Sciences | |
| Catherine Linnen | Arts and Sciences | Biology | |
| Mieke Brummer-Holder | | | Alltech |
| Randall Voss | Medicine | Neuroscience | |
| Jessica Blackburn | Medicine | Molecular and Cellular Biochemistry | |
| Tomo Kawashima | CAFE | Plant and Soil Sciences | |
| Samuel Awuah | Arts and Sciences | Chemistry | |
| Jessica Blackburn | Medicine | Molecular and Cellular Biochemistry | |

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|---|---|---|---|
| Art Hunt | CAFE | Plant and Soil Sciences | |
| Carrie Shaffer | CAFE | Veterinary Science | |
| Nick Teets | CAFE | Entomology | |
| Lisa Vaillancourt | CAFE | Plant Pathology | |
| Jessical Santollo | Arts and Sciences | Biology | |
| Nick Teets | CAFE | Entomology | |
| Vince Venditto | Pharmacy | Pharmaceutical Sciences | |
| Dave Van Sanford | CAFE | Plant and Soil Sciences | |
| Jessica Blackburn | Medicine | Molecular and Cellular Biochemistry | |
| Analia Loria | Medicine | Pharmacology and Nutritional Sciences | |
| Pradeep Kachroo | CAFE | Plant Pathology | |
| Christopher Chase | | | South Dakota State University |
| Michelle Blaha | | | RTI, LLC |
| Jana Norton | | | Alltech |
| Jonathan Satin | Medicine | Physiology | |
| Dave Van Sanford | CAFE | Plant and Soil Sciences | |
| Vince Venditto | Pharmacy | Pharmaceutical Sciences | |
| Jakub Famulski | Arts and Sciences | Biology | |
| Clare Rittschoff | CAFE | Entomology | |
| Vince Venditto | Pharmacy | Pharmaceutical Sciences | |
| Esther Dupont-Versteegden | Health Sciences | Physical Theraphy | |
| Craig Miller | Medicine | Oral Diagnosis | |
| Bryan Harmon | | | Lexington Foot and Ankle Center |
| Tianyan Gao | Medicine | Molecular and Cellular Biochemistry | |
| Amanda Adams | CAFE | Veterinary Science | |
| Jessica Burris | Arts and Sciences | Psychology | |
| Xuguo Zhou | CAFE | Entomology | |
| Brett Spear | Medicine | Microbiology, Immunology and Molecular Genetics | |

| **2019** | College | Department | Other affiliation |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Aardra Kachroo | CAFE | Plant Pathology | |
| James Matthews | CAFE | Animal and Food Sciences | |
| Phillip Bridges | CAFE | Animal and Food Sciences | |
| James Matthews | CAFE | Animal and Food Sciences | |
| Sean Thatcher | Medicine | Pharmacology and Nutritional Sciences | |
| Robin Cooper | Arts and Sciences | Biology | |
| Stefan Stamm | Medicine | Molecular and Cellular Biochemistry | |
| Andrew Hoellein | Medicine | Internal Medicine | |
| Joe Chappell | Pharmacy | Pharmaceutical Sciences | |
| Tomo Kawashima | CAFE | Plant and Soil Sciences | |
| Vince Venditto | Pharmacy | Pharmaceutical Sciences | |
| Kristine Urschel | CAFE | Animal and Food Sciences | |
| Xuguo Zhou | CAFE | Entomology | |
| Subba Reddy Palli | CAFE | Entomology | |
| Luke Moe | CAFE | Plant and Soil Sciences | |
| Kirby Mayer | Health Sciences | Rehabilitation Science | |
| Martin Nielsen | CAFE | Veterinary Science | |
| Martha Grady | Engineering | Mechanical Engineering | |
| Xuguo Zhou | CAFE | Entomology | |
| Xuguo Zhou | CAFE | Entomology | |
| Analia Loria | Medicine | Pharmacology and Nutritional Sciences | |
| Olga Tsyusko | CAFE | Plant and Soil Sciences | |
| Nancy Webb | Medicine | Pharmacology and Nutritional Sciences | |
| Tomo Kawashima | CAFE | Plant and Soil Sciences | |
| Art Hunt | CAFE | Plant and Soil Sciences | |
| Ling Yuan | CAFE | Plant and Soil Sciences | |
| Vince Venditto | Pharmacy | Pharmaceutical Sciences | |
| Nick Teets | CAFE | Entomology | |

| **2020** | College | Department | Other affiliation |
|---|---|---|---|
| Brett Spear | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Erin Haramoto | CAFE | Plant and Soil Sciences | |
| Bob Houtz | CAFE | Horticulture | |
| Luke Bradley | Medicine | Neuroscience | |
| Randy Dinkins | CAFE | Plant and Soil Sciences | |
| Kevin Pearson | Medicine | Pharmacology and Nutritional Sciences | |
| Nicole Gauthier | CAFE | Plant Pathology | |

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|---|---|---|---|
| Dan Howe | CAFE | Veterinary Science | |
| Jen White | CAFE | Entomology | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Mohamed Bazina | Dentistry | Orthodontics | |
| Kate Zaytseva | Medicine | Toxicology and Cancer Biology | |
| Steven Van Lanen | Pharmacy | Pharmaceutical Sciences | |
| Carrie Shaffer | CAFE | Veterinary Science | |
| Bjoern Bauer | Pharmacy | Pharmaceutical Sciences | |
| Pradeep Kachroo | CAFE | Plant Pathology | |
| Xuguo Zhou | CAFE | Entomology | |
| Tianyan Gao | Medicine | Molecular and Cellular Biochemistry | |
| Luke Bradley | Medicine | Neuroscience | |
| Barbara Nikolajczyk | Medicine | Pharmacology and Nutritional Sciences | |
| Clare Rittschoff | CAFE | Entomology | |
| Mark Farman | CAFE | Plant Pathology | |
| Brian Stevenson | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Montserrat Salmeron | CAFE | Plant and Soil Sciences | |
| Salvatore Cherra | Medicine | Neuroscience | |
| Rebecca Dutch | Medicine | Molecular and Cellular Biochemistry | |
| Xuguo Zhou | CAFE | Entomology | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Olga Tsyusko | CAFE | Plant and Soil Sciences | |
| Jessica Blackburn | Medicine | Molecular and Cellular Biochemistry | |
| Luke Moe | CAFE | Plant and Soil Sciences | |
| Brian Stevenson | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Eve Schneider | Arts and Sciences | Biology | |
| Craig Vander Kooi | Medicine | Molecular and Cellular Biochemistry | |
| Michael Samaan | Education | Kinesiology and Health Promotion | |
| Analia Loria | Medicine | Pharmacology and Nutritional Sciences | |
| Patrick Hannon | Medicine | Obstetrics and Gynecology | |

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|---|---|---|---|
| Debra Aaron | CAFE | Animal and Food Sciences | |
| Aardra Kachroo | CAFE | Plant Pathology | |
| Beth Garvy | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Jen White | CAFE | Entomology | |
| Konstantin Korotkov | Medicine | Molecular and Cellular Biochemistry | |
| Xuguo Zhou | CAFE | Entomology | |
| Luciana Shaddox | Dentistry | Periodontology | |
| Clare Rittschoff | CAFE | Entomology | |
| Jessica Blackburn | Medicine | Molecular and Cellular Biochemistry | |
| Natalia Martinez | CAFE | Kentucky Tobacco Research and Development Center | |
| Ann Morris | Arts and Sciences | Biology | |
| Eva Goellner | Medicine | Toxicology and Cancer Biology | |
| Joe Chappell | Pharmacy | Pharmaceutical Sciences | |
| Clare Rittschoff | CAFE | Entomology | |

| **2021** | College | Department | Other affiliation |
|---|---|---|---|
| Robert Hirsch | CAFE | Plant Pathology | |
| Craig Miller | Medicine | Oral Diagnosis | |
| Nick Teets | CAFE | Entomology | |
| Bruce Webb | CAFE | Entomology | |
| Joao Costa | CAFE | Animal and Food Sciences | |
| David Feola | Pharmacy | Pharmacy Practice | |
| Nicole Gauthier | CAFE | Plant Pathology | |
| Tianyan Gao | Medicine | Molecular and Cellular Biochemistry | |
| Luke Moe | CAFE | Plant and Soil Sciences | |
| Robin Cooper | Arts and Sciences | Biology | |
| John Cox | CAFE | Forestry and Natural Resource | |
| Yasuhiro Suzuki | Medicine | Microbiology, Immunology and Molecular Genetics | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Lynne Rieske Kinney | CAFE | Entomology | |
| Pradeep Kachroo | CAFE | Plant Pathology | |

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|---|---|---|---|
| Yvonne Fondufe-Mittendorf | Medicine | Molecular and Cellular Biochemistry | |
| Bruce Downie | CAFE | Horticulture | |
| Tomo Kawashima | CAFE | Plant and Soil Sciences | |
| Luke Bradley | Medicine | Neuroscience | |
| Carrie Shaffer | CAFE | Veterinary Science | |
| Bruce Webb | CAFE | Entomology | |
| Konstantin Korotkov | Medicine | Molecular and Cellular Biochemistry | |
| Patrick Hannon | Medicine | Obstetrics and Gynecology | |
| Bjoern Bauer | Pharmacy | Pharmaceutical Sciences | |
| Amanda Adams | CAFE | Veterinary Science | |
| Craig Vander Kooi | Medicine | Molecular and Cellular Biochemistry | |
| Mark Farman | CAFE | Plant Pathology | |
| Anika Hartz | Medicine | Pharmacology and Nutritional Sciences | |
| David Gonthier | CAFE | Entomology | |
| Nick Teets | CAFE | Entomology | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Luciana Shaddox | Dentistry | Periodontology | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Daniel Lee | Medicine | Neurology | |
| James Matthews | CAFE | Animal and Food Sciences | |
| Jenny Ross | | | Lexington Infectious Disease Consultants |
| John Gensel | Medicine | Physiology | |
| Carlos Rodriguez Lopez | CAFE | Horticulture | |
| Nick Teets | CAFE | Entomology | |
| Penni Black | Pharmacy | Pharmaceutical Sciences | |
| Nicole Gauthier | CAFE | Plant Pathology | |
| Chris Fry | Health Sciences | Athletic Training and Clinical Nutrition | |
| Evangelina Kalaitzoglou | Medicine | Pediatrics | |
| Lindsay Sprangler | | | Corteva Agriscience |
| Tom Adams | Arts and Sciences | Psychology | |

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|---|---|---|---|
| Preetha Shridas | Medicine | Internal Medicine | |
| Montserrat Salmeron | CAFE | Plant and Soil Sciences | |
| Clare Rittschoff | CAFE | Entomology | |
| Yvonne Fondufe-Mittendorf | Medicine | Molecular and Cellular Biochemistry | |
| Ruth McNees | CAFE | Kentucky Tobacco Research and Development Center | |

Publications of Agricultural and Medical Biotechnology Students
2014-2022
Agricultural and Medical Biotechnology Program
College of Agriculture, Food and Environment


Evans, Heather M., Grady L. Bryant, 3rd*, and Beth A. Garvy. The Life Cycles Stages of *Pneumocystis murina* Opposing Effects on the Immune Response to This Opportunistic, Fungal Pathogen. Infection and Immunity. 84.11 (2016): 3195-205.

Jarrett SG, Carter KM*, D'Orazio JA. Paracrine regulation of melanocyte genomic stability: a focus on nucleotide excision repair. Pigment Cell Melanoma Research. 30, 284-293; May 2017.

Wolf Horrell EM, Jarrett SG, Carter KM*, D'Orazio JA. Divergence of cAMP signaling pathways mediating augmented nucleotide excision repair and pigment induction in melanocytes. Experimental Dermatology. 135, 3086-96; July 2017.

Jarrett SG, Carter KM*, Shelton BJ, D'Orazio JA. The melanocortin signaling cAMP axis accelerates repair and reduces mutagenesis of platinum-induced DNA damage. Scientific Reports. 7(1):11708; September 2017.

Szoboszlay, M., Lambers, J.*, Chappell, J.*, Kupper, J., Moe, L., McNear, D. Jr., 2015. Comparison of root system architecture and rhizosphere microbial communities of Balsas teosinte and domesticated corn cultivars. Soil Biology and Biochemistry. 80 (2015) 34-44.

Pitts, M.G., Nardo, D., Isom, C.M*, and V.J. Venditto. 2020. Autoantibody responses to apolipoprotein Al are not diet-or sex-linked in C57BL/6 mice. ImmunoHorizons. 4(8):455-463

Ramalho, T.O., A.R. Figueira, R. Wang, O. Jones*, L.E. Harris* and M.M. Goodin. 2015. Detection and survey of coffee ringspot virus in Brazil. Archives of Virology. 160:1-9 **DOI 10.1007/s00705-015-2663-0**

Pitts, M.G, D. Nardo, C.M. Isom, V.J. Venditto. 2020. Autoantibody Responses to Apolipoprotein A-I Are Not Diet- or Sex-Linked in C57BL/6 Mice. Immunohorizons. Aug5:4(8):455-463. DOI: 10.4049/immunohorizons.2000027

Nardo, D., C.M. Akers, N.E. Cheung, C.M. Isom*, J.T. Spaude*, D.W. Pack, and V.J. Venditto. 2021. Cyanuric chloride as the basis for compositionally diverse lipids. RSC Advances. 11(40):24752-24761.
DOI: 10.1039/d1ra02425f



Ramalho, T.O., A.R. Figueira, R. Wang, O. Jones*, L.E. Harris* and M.M. Goodin. 2015. Detection and survey of coffee ringspot virus in Brazil. Archives of Virology. 160:1-9 **DOI 10.1007/s00705-015-2663-0**

Szoboszlay, M., Lambers, J.*, Chappell, J.*, Kupper, J., Moe, L., McNear, D. Jr., 2015. Comparison of root system architecture and rhizosphere microbial communities of Balsas teosinte and domesticated corn cultivars. Soil Biology and Biochemistry. 80 (2015) 34-44.



Manoj Majee, Shuiqin Wu, Louai Salaita*,Derek Gingerich, Lynnette M.A. Dirk, Joseph Chappell, Art G. Hunt, Richard Vierstra, A. Bruce Downie. 2017. A misannotated locus positively influencing Arabidopsis seed germination is deconvoluted using multiple methods, including surrogate splicing.

Puleo, G. E., Borger, T., Rivera-Rivera, J. N., Montgomery, D.*, & Burris, J. L. (In press). A qualitative study of smoking-related causal attributions and risk perceptions in cervical cancer survivors.

Dong, X, Shannon, HD, Parker, C, Samantha De Jesus*, S, Escobar, IC. Comparison of two low-hazard organic solvents as individual and cosolvents for the fabrication of polysulfone membranes. AIChE J. 2019

Thatcher, S.E., Zhang, X., Woody, S.*, Alsiraj, Y., Charnigo, R., Daugherty, A., and Cassis, L.A. 2015. Exogenours 17-B estradiol administration blunts progression of established angiotensin II-induced abdominal aortic aneurysms in femaile ovariectomized mice. Biol Sex Differ. 2015 Jun 29;6:12. **doi: 10.1186/s13293-015-0030-1**.

**Week 5 – Spring 2022**

# College of Agriculture, Food and Environment

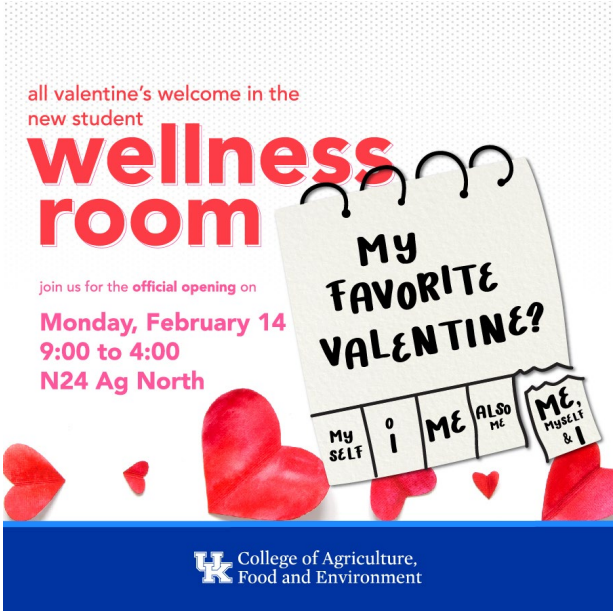
*Agricultural and Medical Biotechnology*

**The Agricultural and Medical Biotechnology Program Newsletter—February 11, 2022**

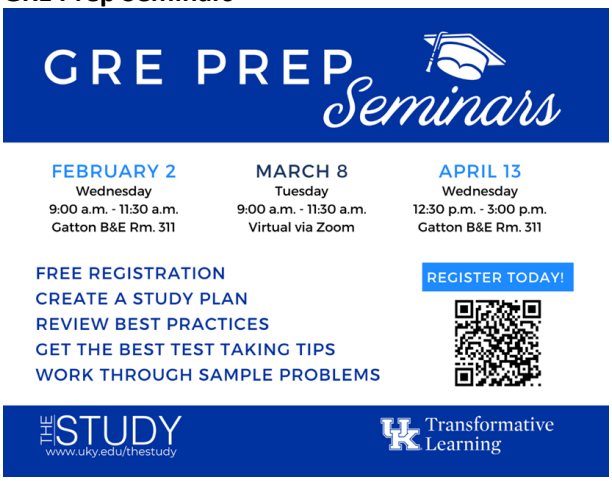
**Exciting Opportunities at the University of Kentucky!—**This week I have come across quite a few opportunities for students who are participating in undergraduate research or for those who want to start their journey in the world of research.

1. The Beckman Fellowship is back at UK! It's been a few years since the Beckman Fellowship was offered at UK. In 2010, then ABT student, Philip Houtz, received the award. It certainly allowed Philip to pursue his interests in research. It propelled him into his PhD at Cornell and a post-doc at Tufts University. It is a huge fellowship, awarding an $18,400 stipend for 15 months, $2,000 for supplies in your lab and $ 5,000 to help support your research mentor and some other perks, like traveling to the Beckman Fellows symposium.
2. How about the CURE Fellowship?! This is a brand new fellowship offering $3,000 for participating in undergraduate research during the summer. The university started this fellowship for the inclusion of a diverse population of undergraduate students involved in research in the following areas: Cancer, cardiovascular health, diabetes & obesity, diversity & inclusion (UNITE), energy, neuroscience, and substance use disorder (SUPRA). CURE welcomes applications from all undergraduate students, with preference given to those who identify with one or more of the following backgrounds recognized as underrepresented or protected. our.uky.edu/cure-fellowship
3. Markey Cancer Center opportunity #1 is working hard to engage students to help in the fight against cancer. The ACTION program is recruiting UK undergraduate students who are natives of Appalachian Kentucky into a cancer-focused training program. Dr. Nathan Vanderford, who is an ABT alum, is the principal investigator for this program. One goal of this program is to provide opportunities for cancer research.
4. Markey Cancer Center opportunity #2 is striving to bring a diverse group of people into the fight against cancer. The STRONG Scholars program is a 10 week summer program dedicated to equip individuals who are underrepresented in science with training in research, oncology, networking, and professional growth for the student.
5. Chellgren Fellows program will open its application soon. First year undergraduates who want to get experience in undergraduate research and work with UK's top faculty are encouraged to apply. The next information session is on Zoom, Feb 16 at 5:30pm.
6. Gain research experience while working in a plant molecular biology lab. Dr. Sharyn Perry, our fall instructor of ABT 201, has a student lab assistant position open in her lab. Contact her at sperr2@uky.edu.
7. Gain lab experience in Dr. Tomo Kawashima's lab. This job would be good experience/introduction if you think you might enjoy working in a lab but have not tried it yet. The Kawashima lab is happy to teach you everything you need to know and in return they expect you to maintain a high standard of work. The jobs are simple and routine, such as washing up, filling tip boxes, harvesting seeds, helping keep the lab clean and organized. Once basic jobs are covered, you can build up to helping with research work when needed. The experience would be useful if you want to work in lab-based science or research in the future. Contact Dr. Anthony Clark, Anthony.clark@uky.edu for more info.

**February 14: Ag North Wellness Room Official Opening**-- Treat yourself! On Monday, you can stop by the college's new student wellness room to grab some self-care goodies, mail a thankful note and more. Browse other upcoming Ag North wellness events at https://bit.ly/3gDCSVP




**GRE Prep Seminars**




**Research Ambassador Interest Session**-- Discover how to serve as an advocate for research and creative work at UK while developing strong leadership skills! To learn more, attend the **Research Ambassador Interest Session** on **February 10** or March 2 @ 6 PM via zoom. Register at https://tinyurl.com/UK-URA-info

**Still We Rise**- is meant to recognize UK students for "rising up" in the face of adversity. The program's name is an homage to Maya Angelou's anthem And Still I Rise. *Still We Rise* provides a forum for students to share their stories of overcoming challenges and recognizes students with awards and scholarship/stipend presentations.
***Applications and nominations***: 2022 Application (requires a LinkBlue login)

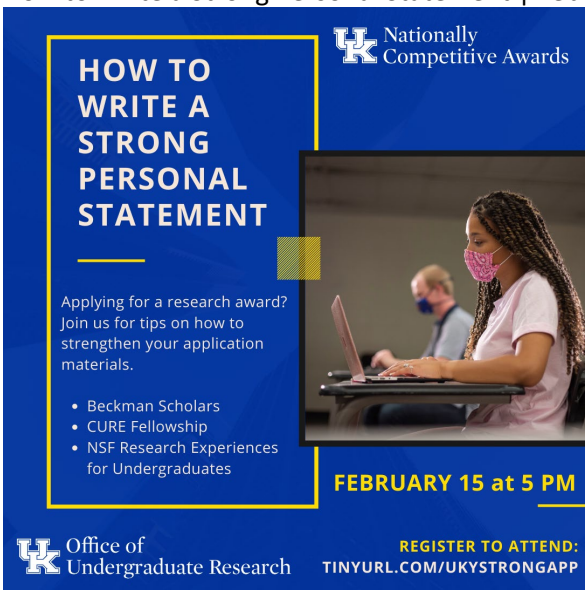

**Shout Out!** to Chase Eastham as a newly inducted member of University of Kentucky Nu Circle of national leadership honor society Omicron Delta Kappa. Chases is an ABT sophomore.
**Shout Out!** to Robert Screen for earning a place on the 2021 SEC Fall Sports Honor Roll. Robert is an ABT senior and a member of the men's soccer team.
Shout Out! to Joseph Ison for being selected for the "Posters at the Capitol" on March 3. Joseph is a senior in ABT, Spanish and Biology. Joseph's poster abstract.
**UK Summer Medical Observership Program** http://students.ca.uky.edu/summer.program
**Appalachian Natural History Seminar Series**—hosted by HON 152-003 during the spring semester.


**Registration Information**—Advisors Holds are in effect.
*ABT Course Sequencing* –review the different sequencing series in the ABT major to plan your fall schedule.

*Athletics Interests and Abilities survey*—all first year students, sophomores and juniors are required to complete the survey before registration.
*Online Course Catalog*—is live.
The reassignment of ABT Freshmen to a permanent advisor is complete. You can view your permanent advisor on your homepage in myUK GPS.
**UK Libraries' Dean's Award for Excellence in Undergraduate Scholarship**-- $1,000 cash awards
Deadline April 4 | More Info: libguides.uky.edu/UGRA.
Visit the FAQ page for answers to our most frequently received questions.
**The UK Woman's Club Scholarship**-- Deadline March 15 | More Info
Consideration will be given to nontraditional female students with financial need.
**CAFE Current and Transfer Student Scholarships Deadline** March 21 | More Info http://students.ca.uky.edu/upper.
**Kentucky Women in Agriculture Scholarship**—$1,000 award | Deadline June 30 | **Attach PDF**
**Pre-Dental Student Undergraduate research scholarship**—Find a COD research mentor from the list on this page: https://dentistry.uky.edu/student-activities-research and apply. | Deadline March 1 |
**The ABT Interest Survey**. Please complete the following survey (which takes about three minutes) so we can connect you with grant, research, scholarship, and fellowship opportunities
Survey: https://uky.az1.qualtrics.com/jfe/form/SV_2fyupOUZAta1hSl
**Michael Goodin Global Aspiration Award-** The Michael Goodin Global Aspirations Award for undergraduate students in Agricultural and Medical Biotechnology program, was established to honor the late Dr. Goodin for his dedication and passion for student success and his sensitivity to student needs. Awards are available to students who are facing challenges in their personal life and/or in their academic career and need urgent financial assistance. Please contact Esther Fleming, efleming@uky.edu, for the application.
**Course Promotion**
ANT 353-002 Anthropology, Environment and Health | U 11:00-1:30pm | March 10-May 5 part-term |
(See flyer in Canvas.)

ABT
AGRICULTURAL & MEDICAL BIOTECHNOLOGY

**February Meeting**—February 15 | 5:00pm | JSB 114 | Research Professor Panel |
Visit the club's page to find out more about upcoming events and study groups for the spring semester.
**Office of Undergraduate Research**
How to Write a Strong Personal Statement | Feb 15 | Register here




Writing a research proposal workshop | Feb 17 | 6pm | zoom | More Info
How to effectively communicate your research | Feb 22 | 6pm | zoom | More Info
Virtual Drop-In Peer Advising | Feb 15, 17, 21, 23 | 10am-12pm | Zoom | Register Here

Sustainability Summer Research Fellowship | Deadline March 1 | More Info
Student Research Air Travel Request | Deadline March 31| Apply Here |
Research Ambassador Applications | Deadline April | Apply Here
New Research Poster Templates Available | More Info
**The Kentucky-West Virginia Louis Stokes Alliance for Minority Participation** (KY-WV LSAMP)
**Campus Resources:** Academic Coaching | Counseling Center | Accommodations
**Math & Science:** The Study | General Chemistry Learning Center | Lab for Economic and Accounting Efficiency (LEAP) | Math Resource Center | Organic Chemistry Learning Center | Physics and Astronomy Learning Center | Biology Learning Center
**Writing, Media & Public Speaking:** Presentation U! | Media Depot | The Writing Center | UK Library Research Guides
**Mental and Physical Health:** University Health Service | UK Counseling Center | Student Behavioral Health
**Safety:** Violence Intervention Prevention (VIP) Center | Escort for Campus Area Traveling | UK Police Department
**Lewis Honors College Upper Level Info Sessions** | Feb 15 2-3pm, Mar 23 1-2pm, April 21 10-11am, May 2 3-4pm | Join Zoom at: https://uky.zoom.us/my/kaylapowell
AAMC MCAT Official Prep Free Resources More Info
**UK Medical School Open House** | Feb 17 | 4:00pm -5:30pm | Register here
**UK Medical School Tours** | First Friday of the Month | Register here
***Worsham Cinema** | International Film Series Presents: Tokoy Godfathers | 7pm & 9pm | Register here*
**Summer Program Opportunities**
College of Medicine Pipeline Programs—are summer programs offered by the College of Medicine at the University of Kentucky to provide unique activities to train students who are considering a career in medicine. | Deadline February 28 |
Professional Education Preparation Program (PEPP) Scholars for rising college freshmen More Info
Professional Education Preparation Program (PEPP) MD/DMD for rising college sophomores More Info
Eligibility for PEPP Scholars and PEPP MD/DMD:
Clear interest in medical school
Be a U.S. citizen or lawful permanent resident
Identifies with a group that is racially/ethnically underrepresented or rural Appalachian in the health professions
Comes from an economically or educationally disadvantage background; and/or has demonstrated an interest in issues affection underserved populations
Submits a compelling personal statement and a strong letter of recommendation
University of Kentucky Medical Education Development Program for rising college juniors More Info
Eligibility:
Rising college juniors
Students who have applied or will be applying to medical school within the next two years
Minimum science GPA of 3.0
**AppalachiaCorps** Internship Program Info Sessions Feb 15, March 28 and April 11 | More Info
SURES UK College of Medicine Undergraduate Research Experience in Environmental Health Sciences Program | Deadline March 4 | More Info
**SURF UK College of Medicine Summer Undergraduate Research Fellowship** | Deadline March 4 | More Info
**NU-CURE Northwestern University Cancer-focused Undergraduate Research Experience** | Deadline March 1 | More Info
The DaRin Butz Undergraduate Summer Research Internship in Plant Biology and Climate Change Research | Deadline Feb 15 | More Info
Integrated Plant Systems—Undergraduate Research Experience | Deadline Feb 15 | More Info
Research Experiences for Undergraduates in Animal Behavior | Deadline Feb 15 | More Info
**Part/Full-time Job Opportunity**
The Soil Physics Lab—The Soil Physics lab is looking for an undergraduate student for field and laboratory work in a soil management project. The student will assist with instrument installations in the field, take field measurements weekly, collect soil samples, process soil samples, analyze and visualize experimental data. The student will learn how to measure soil water content and water infiltration in the field, how to collect soil samples for investigations of soil structure in the laboratory, including aggregate stability and the hydraulic conductivity, water retention, and gas diffusivity functions. The project work will begin mid of February and last until the summer. The work is about 10-20

hours per week, and payment is based on experience and is based on the college's recommendation. The opportunity also exists for an undergraduate research project.
Contact: Ole Wendroth, Department of Plant & Soil Sciences, phone: 859-257-4768, AG-North N-122M; owendroth@uky.edu

**Research Project Opportunities**

Themofly REU—The Themofly Research Experience for Undergraduates project is hiring several full-time interns for the summer, to work at either University of Kentucky (in my lab), or labs at University of Vermont, Providence College, and Salve Regina University. The internship will include a week of fieldwork (covid willing), followed by a lab-based research experience at your host institution. Stipends and housing will be provided. | Deadline March 1 | Apply here https://www.thermofly.org/reu

Nicole Gauthier | Assistant Professor | ngauthier@uky.edu |Website | Department of Plant Pathology
The Gauthier Lab in the Department of Plant Pathology consists of applied and molecular pathologists, students, and collaborators from other departments. Dr. Gauthier's program focuses on specialty crop disease problems as they relate to grower needs. Most of their research is on hemp diseases, primarily Fusarium bud and flower blight. Research methods include field trials such as overwintering and cross infection studies, greenhouse assays, and lab-based molecular diagnostics and microscopy. Basically we grow beautiful *Cannabis sativa*, and then we kill it with *Fusarium graminearum*, all for fun!

Amanda Adams | Associate Professor |Amanda.Adams@uky.edu | Website | Department of Veterinary Science
Dr. Amanda Adams is an Associate Professor at the Gluck Equine Research Center, University of Kentucky. She is also Adjunct faculty at Lincoln Memorial University, College of Veterinary Medicine, and has been recently honored as a Mars Equestrian™ Fellow, specializing in the care of senior horses. Currently, her research program encompasses the study of equine immunology and endocrinology in the areas of aging, obesity/endocrine diseases/laminitis, and stress. Her research program is world renown in that she has established and supports a unique herd of aged, PPID, obese/metabolic syndrome, insulin dysregulated horses that are maintained at the Gluck Center, for both basic and applied research.
More specifically, within the '*aging*' area of her research program they are focused on characterizing mechanisms of age-associated changes in immune responses, with particular interest on immune responses to vaccination and the inflamm-aging process, as well as loss of muscle mass with aging and how all may be related. An additional focus of her aging research program is to understand how endocrine disease, Pituitary *pars intermedia* dysfunction (PPID), of aged horses may affect these immune responses, as well as metabolic responses. Within the '*obesity*' area of her program, her goal is to understand the effects equine metabolic syndrome (EMS) and insulin dysregulation on immune and metabolic responses in the horse, and how they may induce laminitis. Her current focus is to characterize and understand what is driving the post-prandial responses in EMS horses/insulin dysregulated horses, and how to control these responses with nutritional management and novel pharmaceuticals, to reduce the risk of laminitis in these horses. The third area of my research involves investigating models of '*stress*' including transportation stress, and how these stress responses impact immune and metabolic functions of horses.

**Important Spring Dates**

Jan 10-First Day of Classes | Jan 14-Last day to add a class |Jan 17 Martin Luther King Day—Academic Holiday | Jan 28-Last day to drop a class or change grading option | Feb 28-Advisor Connect Day | March 7- April 8 CAFE Advising Period |March 14-Midterm | March 14-19 --Spring Break | March 28—Last Day to Withdraw | March 28-April 19 –Priority Registration | April 19 & April 21- ABT 395/399 Student Presentations| April 25-27 Prep Days Classes Meet | April 27—ABT 201 Mixer | April 27—Last Day of Classes | April 28 & 29 —Reading Days NO classes | May 2-5 – Finals | May 5—ABT Senior Send Off 6:00pm-8:30pm | May 6--End of Spring 2022 semester | May 6 & May 7 Commencement

Take care,
Esther

# Selected Awards Received by Agricultural and Medical Biotechnology Students

National Conference on Undergraduate Research Participants
2014 Ashlee Anciro, Hannah Arvin, James Bastin, Toria Fischer, Jessica Gambrel, Samuel Janes, Stuartt Lichtenberg, Jessica Lowe, Jesse matherly
2015 Samuel Potter, Allison Young
2016 Thaiiesha Beard, Alex Bugg, Catherine Crawford, Rachel Potter, Ashley Stevens, Callista Whorf, Alonna Wright
2017 Alberto Rondon
2018 Josiah Liew, Angela Wei
2019 Lydia Fletcher and Kara Tauer, Stevi Howard, Angela Wei
2020 Katelyn Cox and Francisco Beltran
2021 Francisco Beltran, Caleb Gooden and Anna Foose

Chellgren Scholars
2014 Evelyn Beckert
2015 Kylie Colvin, Heather Gosnell
2016 Seth Biedenbender, Matthew Jones, Emily Major, Angela Wei
2017 McKaylee Copher, Kara Tauer,
2018 Cole Blandford, Carly Boone, James Campbell, Chey Chandler
2019 Hannah Cleary, Anna Foose, Alyse Ptacek, Reagan Smith, Emory Wilds
2020 Rachael Snyder
2021 Chase Eastham, Megan Johnston

General Chemistry Excellence Award
2018-2019 Hannah Cleary

Sustainability Summer Research Fellowship Awards
2021 Courtney Shields, Bridget Bolt and Gretchen Ruschman

UK Sustainability Undergraduate Poster Competition
2021 Bridget Bolt

National Alpha Lambda Delta Scholarship
2020 Hannah Cleary
2021 Jessica Lamb

CAFE Undergraduate Research Activity Awards
2021-2022 Bridget Bolt, Caitlynn Bryant, Michael Buoncristiani, Kristin Carlton, Katie Chheang, Benjamin Clements. Megan Dakoske, Sarah Fields, Sundus Ghuneim, Joseph Ison, Amy Joubert, Courtney Shields, Henry Smith, Alexander Stewart, Grant Walles, Annabelle Wilson, Caleb Gooden
Spring 2022 Caitlynn Bryant, Meghana Gazula, Megan Johnston, Jessica Lamb, Grace Ramey, Arianan Spina, Abigail Vetter

University of Kentucky

# AGRICULTURAL *and* MEDICAL BIOTECHNOLOGY

## Science is in Our Genes

The Agricultural and Medical Biotechnology (ABT) program is a life sciences degree for students who wish to pursue opportunities in biotechnology, human health, agricultural productivity and environmental sustainability. You will gain a strong foundation in chemistry, biology and genetics, be mentored by exceptional scientists, and gain valuable hands-on experience in cutting-edge research.

The design of the degree allows you to individualize coursework in a scientific area tailored to your career goals. To develop your skills as a scientist, you will complete your own research project under the guidance of a mentor of your choosing. You will be well prepared for a rewarding career in the agricultural or biomedical sciences with opportunities for graduate training in biological research, human and veterinary medicine, and other related professional fields.

## CAREERS

This bachelor of science degree will prepare you for rewarding opportunities with biotechnology organizations, diverse academic disciplines, and governmental agencies including:

**Pharmacists**
*Dispense prescription medications to patients and offer expertise in the safe use of prescriptions.*
2019 Median Pay: $128,090

**Medical Scientists**
*Conduct research aimed at improving overall human health.*
2019 Median Pay: $88,790
Ten-Year Job Outlook: 8% (faster than average)

**Agriculture and Food Scientists**
*Research ways to improve the efficiency and safety of agricultural establishments and products.*
2019 Median Pay: $65,160
Ten-Year Job Outlook: 7% (faster than average)

**Chemists and Materials Scientists**
*Study substances at the atomic and molecular levels and analyze the ways in which the substances interact with one another.*
2019 Median Pay: $78,790

*Source: U.S. Bureau of Labor Statistics, Occupational Outlook Handbook www.bls.gov/ooh/*

**1.66** million people were employed by a bioscience firm[1]

### UN-BIO-LIEVABLE

SCAN ME

**Program Contact**
Esther Fleming
efleming@uky.edu
(859) 257-3263
N-212J Ag Science Center

For more program info, take a photo of this code with your smartphone. No special app required.

### DID YOU KNOW?

In our most recent advising survey, two-thirds of ABT students said they were extremely satisfied with their advisor, the highest rating possible. When asked what they like about their advisor, one student responded with:

> *"Everything really. He is a great person to get connected with for the friendship as well as all of the great advice he provides for classes and outside the academic world. He is always willing to meet to help us with anything - even if it is just to get some coffee and chat. I couldn't ask for a better advisor."*

[1] *The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life, 2016; Biotechnology Innovation Organization*

**ABT STUDENTS** have a variety of interests, but they all have one thing in common: they want to use science to improve lives around the world.

## RESEARCH EXPERIENCE

Research experience is at the heart of what we do. Your research mentor may recommend undergraduate student presentation opportunities at the appropriate professional meetings in your research field.

Students in ABT may also compete for the Glenn B. Collins Undergraduate Research Achievement Award that recognizes outstanding independent study and research.

## ORGANIZATIONS AND CLUBS

### ABT Club

*Members are engaged with students, faculty, and professionals within biotechnology-related interests*

### Pre-Med Activities Council

*Bringing together aspiring health professionals for service and opportunities to prepare for professional school*

### Pre-Vet Club

*Utilized as a connection point for students to plan and prepare for veterinary school as a collective group*

## HIGHLIGHTED COURSES

### ABT 201: Scientific Method in Biotechnology

Engaging with research is a daunting prospect for college students, but ABT 201 prepares future biotechnologists for successful research experiences by introducing who our scientists are and what the scientific method looks like in laboratories at UK.

### ABT 301: Writing and Presentation in the Life Sciences

The hallmark of successful scientists are scholarly products like manuscripts and presentations. Students in ABT 301 learn how to develop and refine written and oral presentation skills required for any future professional.

### ABT 395: Independent Study in Biotechnology

ABT 395 is not a regular classroom course. Instead of lectures and exams, you go to your lab and spend your time conducting experiments, collecting data, and analyzing results with the support of your research mentor.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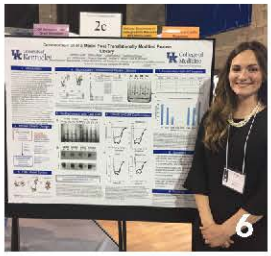
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***Photo 1:*** *Student whose undergraduate research experience could help farmers control one of their most troublesome pests*

***Photo 2:*** *Students at the Expanding Your Horizons conference teaching Middle School Girls in the Jacobs Science Building*

***Photo 3:*** *ABT student conducting research pictured inoculating a large scale trial for a pro-biotic to be added to animal feed*

***Photo 4:*** *ABT Club president and graduate of the ABT program.*

***Photo 5:*** *ABT 495 Seniors in the lab*

***Photo 6:*** *ABT Student presenting her research poster*

***Photo 7:*** *Recipient for the Spring 2019 Glenn B. Collins Award and her mentor*

# *Bachelor of Science in Agricultural and Medical Biotechnology*

## Suggested Four Year Plan

(Effective Fall 2017)

### *Year One*

| Fall | | | Spring | | |
|---|---|---|---|---|---|
| ABT 101 | Introduction to Biotechnology | 1 | ABT 120 | Genetics & Society | 3 |
| CHE 105 | General Chemistry I | 4 | BIO 148 | Introductory Biology 1 | 3 |
| CHE 111 | General Chemistry Lab I | 1 | BIO 155 | Lab for Intro Biology 1 | 1 |
| CIS/WRD 110 | Composition & Communication I | 3 | CHE 107 | General College Chemistry II | 3 |
| GEN 100 | Current Issues In Ag & NRES | 3 | CHE 113 | General College Chemistry II Lab | 2 |
| MA 113 | Calculus I **OR** | | CIS/WRD 111 | Composition & Communication II | 3 |
| MA 123 | Elementary Calculus **OR** | | | | **15** |
| MA 137 | Calculus I with Life Science Apps | 4 | | | |
| | | **16** | | | |

### *Year Two*

| Fall | | | Spring | | |
|---|---|---|---|---|---|
| ABT 201* | Scientific Method in ABT | 1 | CHE 232 | Organic Chemistry II | 3 |
| BIO 152 | Principles of Biology II | 3 | CHE 233 | Organic Chemistry II Lab | 1 |
| CHE 230 | Organic Chemistry I | 3 | STA 296 | Stats Methods & Motivations **OR** | |
| CHE 231 | Organic Chemistry Lab I | 1 | BST 230 | Stats Thinking for Pop Health | 3 |
| UK Core | Arts & Creativity | 3 | UK Core | Social Science | 3 |
| | Electives | 4 | UK Core | Humanities | 3 |
| | | **15** | | Elective | 2 |
| | | | | | **15** |

### *Year Three*

| Fall | | | Spring | | |
|---|---|---|---|---|---|
| ABT 301 | Writing & Presentation in Life Sciences | 2 | BCH 401G | Fundamentals of Biochemistry | 3 |
| | | | BIO 308 | General Microbiology | 3 |
| ABT 360 | Genetics **OR** | 3-4 | BIO 309 | Microbiology Laboratory | 2 |
| BIO 304 | Principles of Genetics | | PHY 213 | General Physics II | 5 |
| PHY 211 | General Physics | 5 | | Specialty Support | 3 |
| UK Core | Global Dynamics | **3** | | | **16** |
| | Specialty Support | **3** | | | |
| | | **16-17** | | | |

### *Year Four*

| Fall | | | Spring | | |
|---|---|---|---|---|---|
| ABT 495 | Experimental Methods in ABT **OR** | | ABT 460 | Intro to Molecular Genetics | 3 |
| | | | ABT 461 | Intro to Population Genetics | 3 |
| BIO 510 | Recombinant DNA Tech Lab | 4 | | Specialty Support | 9 |
| ABT 395 | Ind. Study in ABT **OR** | | | | **15** |
| ABT 399 | Exp. Learning IN ABT | 3 | | | |
| | Specialty Support | | | | |
| | Elective | 3 | | | |
| | | **16** | | | |

**Minimum Total Number of Hours Required: 125**

*Students must complete CIS/WRD 110 and CIS/WRD 111 and have earned 30 hours before taking ABT 201.

# *Agricultural and Medical Biotechnology*

## COURSE DESCRIPTIONS

**ABT 101 Introduction To Biotechnology (1)** An introduction to biotechnology: historical perspectives, current applications and future directions. The course will consist of informal lectures and interactive discussions led by Biotechnology faculty and visiting professionals. The course will also orient students to the educational/career opportunities in Biotechnology and assist them in developing a focus for their individualized degree programs. Lecture, two hours per week.

**ABT 120 Genetics and Society (3)**
This course is designed for science and non-science majors, giving students an understanding of how genetics influences and impacts our social fabric on a daily basis, and equipping students with a sufficient understanding to participate in the policy debates that are impacting our lives. The course will introduce students to the basic concepts of genetics and to the modern methodologies of molecular genetics. The course will also educate students in the process of scientific discovery and empower students with the knowledge and critical thinking skills necessary to evaluate the present and future impact of genetics on society. While the course is intended for first semester freshmen, students at all class standings are welcome to enroll.

**ABT 201 Scientific Method In Biotechnology (1)** A course designed to acquaint students with the common experimental methods used in agricultural biotechnology. Students will be presented with several case studies which demonstrate basic scientific reasoning and experimental strategies. The students will then use their understanding of basic scientific methods and agricultural systems to critically evaluate work from the current scientific literature. Each student will be required to provide a written and oral evaluation of a research project in some aspect of agricultural biotechnology. The class will provide the students with the basic skills needed for preparing their own research proposals. Prereq: ABT 101 and enrollment in the Agricultural Biotechnology degree program or consent of instructor.

**Check out the UK ABT Club on Facebook: @UKABTClub**

**ABT 301 Technical Writing and Presentations in Biotechnology (2)** This course will focus on effective communication of ideas and research results in biotechnology. It will focus on both written presentations, in the form of research publications and research proposals, and oral presentations. The focus of this course is on student participation. Students will be required to provide both oral and written evaluations of research publications and proposals. The first part of the semester will focus on a dissection, evaluation, and discussion of recent Biotechnology-related research publications. Students will be required to provide both oral and written evaluations of the publications that are discussed. Next, they will discuss the aspects of successful oral presentations, including the effective use of visual aids. The middle of the semester will be spent developing a research proposal, focusing on the separate components of a proposal. The end of the semester will involve student presentations of a research proposal that they have developed. These presentations will be evaluated and discussed by the other members of the class. The goal of this course is to develop skills in the evaluation of research, to provide practice in scientific writing, to prepare Biotechnology students to write their independent study research proposals and written reports, to develop oral communication skills, and to expose students to current literature and research in Biotechnology. Lecture, discussion and oral presentations. Prereq: Agricultural Biotechnology major or consent of instructor.

College of Agriculture, Food and Environment

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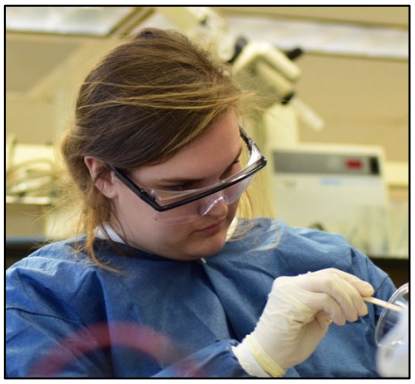
# *Agricultural and Medical Biotechnology*

## COURSE DESCRIPTIONS

**ABT 360 Genetics (3-4)** The basic principles of heredity as currently understood from evidence accumulated in classical, cytogenetic, molecular, and quantitative genetic experiments. Emphasis is placed on a thorough understanding of genetic principles and the relationship of genetics to all biological disciplines. Prereq: Six credits in biological sciences and one course in general chemistry. (This course is cross listed as ASC/ENT 360.)

**ABT 395 Independent Study In Biotechnology (3-4)** Independent study (research project) in biotechnology under the supervision of a faculty member. Prereq: Agricultural Biotechnology major and consent of appropriate instructor before registration.

**ABT 399 Experimental Learning In Biotechnology (3-4)** An internship in biotechnology under the supervision of a faculty member. May be repeated to a maximum of six credits. Prereq: Consent of the instructor, chairperson for the Agricultural Biotechnology degree program and completion of a learning contract before registration.

**ABT 460 Introduction to Molecular Genetics (3)** Molecular genetics is the study of the biochemical basis of heredity and focuses on the structure and expression of DNA at the molecular and cellular level. The course will provide a detailed understanding of the biochemical events involved in replication, prokaryotic and eukaryotic transcription, and translation of DNA, as well as RNA processing, recombination, and the theoretical underpinnings of genetic engineering. Prereq: ABT 360 or BIO 304, Agricultural Biotechnology major, or consent of instructor. (This course is cross listed as ENT 460.)

**ABT 461 Introduction To Population Genetics. (3)** This survey course examines the population dynamics and equilibria of genes in nuclei, chloroplasts and mitochondria. Emphasis will be on biological relevance (in plants, animals, and micro-organisms), but some theoretical derivations will also be introduced. Prereq: ABT 360 (or equivalent) and one course in probability/statistics. (This course is cross listed as BIO/ENT/FOR 461.)

**ABT 495 Experimental Methods In Biotechnology (4)** A laboratory techniques course designed to give students the technical skills and understanding necessary to critically examine biological systems at the molecular level. The course will emphasize the principles of chemistry, biochemistry and molecular biology as applied to a model system for laboratory investigations. Laboratory, nine hours per week. Prereq: ABT/ENT 360 or BIO 304, Agricultural Biotechnology major or consent of instructor.

College of Agriculture, Food and Environment

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# *Agricultural and Medical Biotechnology*

# INDEPENDENT RESEARCH PROJECTS

**April Lamb** Virulence and Genetic Determinants of Resistance to Streptomycin by the Tobacco Angular Leaf Spot Bacterium, *Pseudomonas syringae* pv. Tabaci
*Mentor: Dr. Emily Pfeufer, Department of Plant Pathology, UK College of Agriculture, Food and Environment*

**Grace Higgs** Distribution of Sodium in Bovine Brain Tissue in Relation to Diagnosing Sodium Intoxication
*Mentor: Dr. Cynthia Gaskill, Department of Animal Sciences- Equine Programs, UK College of Agriculture, Food and Environment*

**Meredith Johnson** Protective Effects of Maternal Exercise on Male Offspring Born to Mothers Exposed to PCB126
*Mentor: Dr. Kevin Pearson, Department of Pharmacology & Nutritional Sciences, UK College of Medicine*

**Osei Jordan** How Does an Alzheimer's Disease Associated SNP Alter Expression or Splicing of MEF2C?
*Mentor: Dr. Steve Estus, Department of Physiology and Sanders-Brown Center on Aging, UK College of Medicine*

**Zachary Byrd** Utilization of Biomass Enzymes in Oak Additives
*Mentor: Dr. Seth DeBolt, Department of Horticulture, UK College of Agriculture, Food and Environment*

**Breanna Shoemaker** Expression and Functional Analysis of dsRNA Binding Proteins Loq and R2D2
*Mentor: Dr. Subba Reddy Palli, Department of Entomology, UK College of Agriculture, Food and Environment*

**Angela Wei** Immunohistochemistry of ABCC9 Proteins in Human Brain Tissue
*Mentor: Dr. Peter Nelson, Department of Pathology, Division of Neuropathology and Sanders-Brown Center on Aging, UK College of Medicine*

**Bryce Marks** Integration of AAV8 Cap and AAV2 Rep into Cell Line 293ltv
*Mentor: Dr. Michael Mendenhall, Department of Molecular & Cellular Biochemistry and the Center for Molecular Medicine – Genetic echnologiesCore, UK College of Medicine*

**Emily Major** Development and Characterization of a Model Post-Translationally Modified Protein Library
*Mentor: Dr. Luke Bradley, Department of Neuroscience and the Department of Molecular & Cellular Biochemistry, UK College of Medicine*

**Tyler Barton** Chitosan-double Stranded RNA Nanoparticle Influence on Expression of myo-3 in *Caenorhabditis elegans*
*Mentor: Dr. Jason Unrine, Department of Plant and Soil Science, UK College of Agriculture, Food and Environment*

**Nicole Payne** The Impact of Egg Size on *Neodiprion* Sawflies
*Mentor: Dr. Catherine Linnen, Department of Biology, UK College of Arts & Sciences*

**Anna Kogoy** Changes in Mineral Deposition in Foal Mane Hair from Birth through Weaning
*Mentor: Dr. Mieke Brummer-Holder, Department of Animal & Food Sciences, UK College of Agriculture, Food and Environment*

**Clay Chew** Transgenics and Heredity of TALEN Edited Alleles in Axolotls
*Mentor: Dr. Randal Voss, Department of Biology, UK College of Arts & Sciences*

**Maya Cleveland** p53 Status Profiling of T-cell Acute Lymphoblastic Cell Lines
*Mentor: Dr.Jessica Blackburn, Department of Molecular & Cellular Biochemistry, UK College of Medicine*

**Raegan Crossfield** The Control of FORMIN Twelve on Actin Cytoskeleton in Early Phase Endosperm Development
*Mentor: Dr. Tomokazu Kawashima, Department of Plant and Soil Science, UK College of Agriculture, Food and Environment*

**Henry Moore** Finding New Molecules to Target an Old Pathway in Cancer
*Mentor: Dr. Jessica Blackburn, Department of Molecular & Cellular Biochemistry, UK College of Medicine*

**Katelyn Cox** Transient Transfection of Mammalian Cells with Luciferase and mCherry Reporter Genes for Gold-Based Chemotherapeutics Screening
*Mentor: Dr. Samuel G. Awuah, Department of Chemistry and the Department of Pharmaceutical Sciences, UK College of Arts & Sciences and UK College of Pharmacy*

**Josiah Liew Liq Jong** Mutant FIP1 and Alternative Polyadenylation Profiles in *Arabidopsis thaliana*
*Mentor: Dr. Arthur Hunt, Department of Plant and Soil Science, UK College of Agriculture, Food and Environment*

College of Agriculture, Food and Environment

*www.uky.edu/ABT*

# *Agricultural and Medical Biotechnology*

## INDEPENDENT RESEARCH PROJECTS

**Keaston Johnson** The Role of CagG and CagZ in the *H. pylori cag* Type IV Secretion System
*Mentor: Dr. Carrie Shaffer, Department of Veterinary Science, UK College of Agriculture, Food and Environment*

**Randell Brewer** Direct and Indirect Effects of Winter Warming on Wolf Spiders
*Mentor: Dr. Nicholas Teets, Department of Entomology, UK College of Agriculture, Food and Environment*

**Hye Ree Yoon** Further Characterization of Strains of *Colletotrichum* Causing Bitter Rot Disease of Apples in Kentucky Orchards
*Mentor: Dr. Lisa Vaillancourt, Department of Plant Pathology, UK College of Agriculture, Food and Environment*

**Joseph Stuart** How Does Estradiol Affect the Expression of Genes Associated with the G-protein and MAPK Pathways in Areas of the Brain that Control Drinking in Ovariectomized Female Rats?
*Mentor: Dr. Jessica Santollo, Department of Biology, UK College of Arts & Sciences*

**Kylie Colvin** Evaluating the Effects of Cold on Drosophila S2 Cells
*Mentor: Dr. Nicholas Teets, Department of Entomology, UK College of Agriculture, Food and Environment*

College of Agriculture, Food and Environment

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# *Agricultural and Medical Biotechnology*

## CAREERS

**Research Associate in Cancer Center**

**Research Technician**

**Pharmacist**

**Medical Doctor**

**PhD in Horticulture**

**Physical Therapist**

**Optometrist**

**Associate Scientist**

**Physician Assistant**

**Assistant Breeding Project Lead**

**Account Executive**

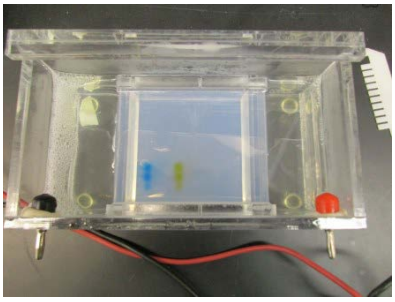
**Veterinary Technician**

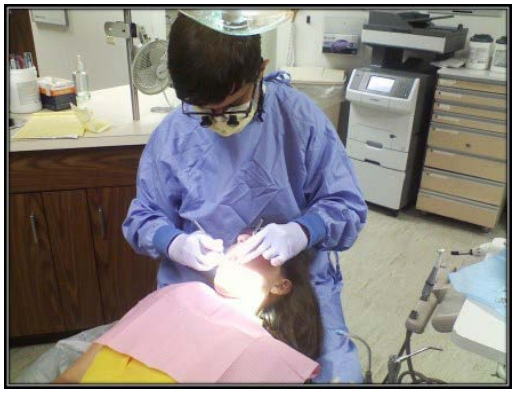
**Microbiology Technician**

**Masters in Nursing**

**Hospital Technician**

**Veterinarian**





**Dentist**

**Quality Assurance Technician**

**Science High School Teacher**

**Pharmacy Technician**

**Masters in Biosystems and Engineering**

**Lab Technician-Entomology**

**PhD in Plant and Soil Sciences**

**Campaign Leadership Staff**

College of Agriculture, Food and Environment

*www.uky.edu/ABT*

# Disney ANIMALS, SCIENCE and ENVIRONMENT
## PROFESSIONAL INTERNSHIPS

*The Agricultural Sciences team, part of Disney's Animals, Science & Environment, offers Professional Internships designed to provide qualified college students with the opportunity for hands-on work experience in the unique growing areas that are part of Living with The Land, an agricultural attraction at Epcot®.*

## Responsibilities:

In addition to maintaining the show quality of our growing areas, aquaculture systems and biotechnology lab, interns will spend a significant amount of time leading informative and interactive guest tours through our facilities, along with promoting and selling these tours. Additional training sessions, classes and meetings will be scheduled throughout the semester. Other duties vary by discipline:

*Aquaculture*

Operate a recirculating freshwater aquaculture facility. Monitor filtration systems and water quality, assist in diagnosis and control of disease, and raise fish to marketable size for *Walt Disney World®* restaurants.

*Biotechnology*

Maintain a tissue culture production facility. Prepare media and culture a wide variety of plants. Then, collect, package and deliver the tissue-cultured plants to *Epcot®* merchandise locations.

*Entomology*

Become an integral part of The Land's Integrated Pest Management program. Rear and maintain insect colonies, release beneficial insects into greenhouse crops, and maintain entomology-related shows.

*Plant Science*

Maintain a high-quality show of hydroponically-grown food crops from around the globe. Seed, transplant, irrigate and prune plants; harvest produce for *Epcot®* restaurants; rake, sweep, and provide general cleanup of greenhouses.

## Minimum Requirements:

- College student or recent graduate (must apply within six months of graduation) with background and/or major in agriculture, plant science, horticulture, biology, biotechnology, entomology, aquaculture, education, or related field.
- Team player with demonstrated verbal communication skills and the ability to interact positively with both Walt Disney World® Guests and fellow Cast Members.
- Demonstrated work ethic, reliable transportation, and willingness to work on a flexible schedule.
- Willingness and ability to adhere to the Walt Disney World® personal appearance standards.
- Completed online application.

## How to Apply:

Go to http://disneyinterns.com/science. Search for Agricultural Sciences. Select the internship(s) you are interested in applying for, and fill out the application(s).

On your application, please upload your resume, cover letter and current transcripts (including your name, cumulative GPA, and any courses you are currently taking).

Call or email us with any questions.

Telephone: (407) 560-7256
Email: wdw.epcot.science.internship@disney.com

## Internship Schedule

*Winter/Spring 2018:*
January 2018- June 2018

*Summer/Fall 2018:*
June 2018 - January 2019

*Winter/Spring 2019:*
January 2019 - June 2019



Disney Campus Recruiting
1515 Buena Vista Dr
Orlando, FL 32830

# Alltech Research Internship Program

More and more college students are realizing the value of work experience in their chosen field before graduation. In fact, the number of undergraduates participating in internships or co-op experiences during college has risen to a high of 65 percent, according to the National Association of Colleges and Employers *Class of 2015 Student Survey*. It also found that students who participate in paid internships have a greater chance of graduating with a job offer.

What better way to experience a future career than by interning with a potential employer?

More than 170 students have gained invaluable experience as interns at Alltech's Center for Nutrigenomics and Applied Animal Nutrition since the world-renowned research facility opened in 2008. All these student researchers have completed projects impacting the company's research program aimed at creating solutions for the global

National Science Foundation
WHERE DISCOVERIES BEGIN

# For Students

NSF funds a large number of research opportunities for undergraduate students through its REU Sites program. An REU Site consists of a group of ten or so undergraduates who work in the research programs of the host institution. Each student is associated with a specific research project, where he/she works closely with the faculty and other researchers. Students are granted stipends and, in many cases, assistance with housing and travel. Undergraduate students supported with NSF funds must be citizens or permanent residents of the United States or its possessions. An REU Site may be at either a US or foreign location.

By using the web page, Search for an REU Site (reu_search.jsp), you may examine opportunities in the subject areas supported by various NSF units. Also, you may search by keywords to identify sites in particular research areas or with certain features, such as a particular location.

Students must contact the individual sites for information and application materials. NSF does not have application materials and does not select student participants. A contact person and contact information is listed for each site.

National Science Foundation, 2415 Eisenhower Avenue, Alexandria, Virginia 22314, USA Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

agriculture industry.

From traditional nutrition evaluation trials to evaluation and optimization of production processes, these students (the majority of them undergraduates) not only learn valuable information but also gain hands-on experience and training. Many have set themselves on paths to graduate school. Others have even found their career path with Alltech.

“The experience has opened a lot of doors to opportunities I had not imagined,” said Hayley Kincaid, a recent biology graduate of the University of Pikeville in Kentucky.

Kincaid joined the internship program right after graduation so she could begin gaining research laboratory experience. “I never expected to be here,” she said, “but I love working in the lab.” Kincaid is working with the poultry nutrition group during her time at Alltech.

“I didn’t know that companies like Alltech existed,” said Kincaid, who learned about Alltech and the internship program when a company representative visited her school. She is excited about future opportunities with companies like Alltech in Eastern Kentucky.

The only problem she has with her three- to four month-internship at Alltech is she would like it to be longer. “I just like it so much; I want to stay!” she said.

For many, an internship with Alltech is the type of experience needed before making a decision to pursue an advanced degree in a scientific field.

Megan Dudley, a psychology major at the University of Kentucky with an interest in neuroscience and genetics research, plans to eventually pursue a Ph.D. in the field. A professor mentioned a potential internship at Alltech could be advantageous.

“The experience in methodology will be invaluable when applying to grad school,” Dudley said.

The experience in the laboratory has not been the only benefit. “I think my confidence level has increased dramatically from being here,” Dudley said, explaining that she takes responsibility for her research project in a new way, which will be necessary for graduate school.

For others, an internship experience with Alltech is a determining factor in a career not just in research, but with the company.

Amanda Sberna is the senior lab technician and marketing specialist for the Analytical Services Laboratory at Alltech. She interned with Alltech before graduation.

“Through my internship I gained knowledge and skills that would help me to become the scientist I am today,” she said. “Alltech is an incredible company to work for, offering many different opportunities with your career.”

For more information about Alltech’s student research internship program, or to apply, please visit http://www.alltech.com/about/careers/internships.

## Crop to canine: Sustainable pet food starts in the soil

As consumers gravitate toward functional "superfoods" and food cultivated using sustainable practices, they often apply the same scrutiny to their pets' food. ...


## Stressed crop demo displays strength of Alltech Crop Science

When faced with the challenge of quickly showing product efficacy to a new dealer, Alltech Crop Science (ACS) U.S. technical sales manager Brian Springer decided to take an innovative approach. “We didn’t have time or space for a traditional demo,” says Springer, who searched for a way that would highlight how ACS products help...


## Don’t let frost bite your crops this winter

Crops like grapes and peaches are among the most impacted by frost, which can lead to physiological stress and a reduction in plant development. The application of amino acid-based solutions is a first-string approach to mitigating damage caused by dropping temperatures and frost. In the town of Farroupilha (in the state of Rio Grande do...

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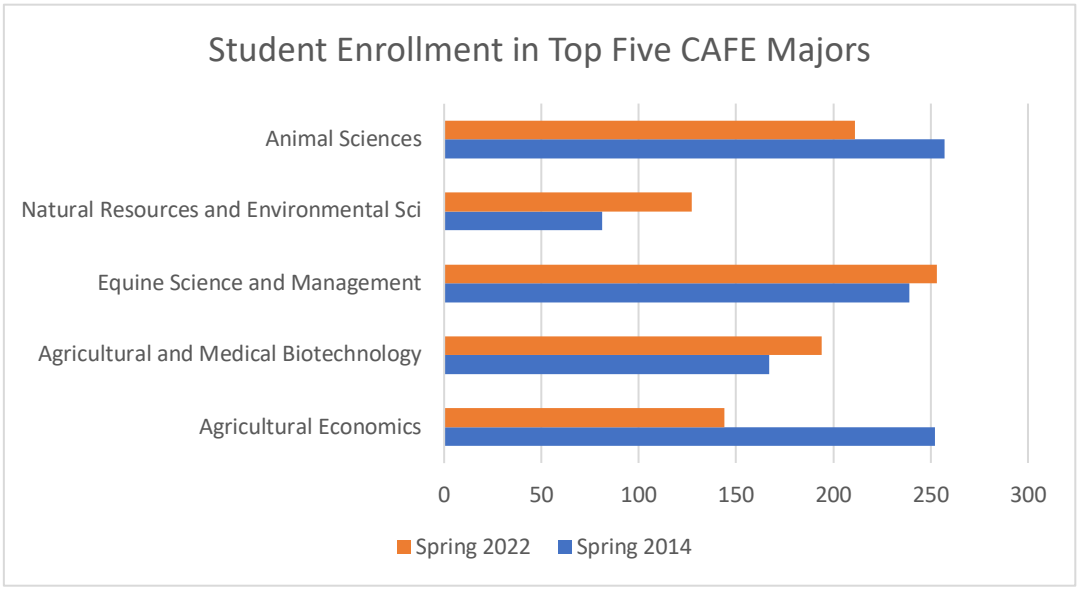
| CAFE Major | Number of Students Spring 2014 | Number of Students Spring 2022 |
|---|---|---|
| Agricultural Economics | 252 | 144 |
| Agricultural and Medical Biotechnology | 167 | 194 |
| Equine Science and Management | 239 | 253 |
| Natural Resources and Environmental Sci | 81 | 127 |
| Animal Sciences | 257 | 211 |



# PRE-DENTAL ADVISING

At the University of Kentucky (UK), pre-professional programs are interest areas that students complete alongside their UK Core requirements and major curriculum. Students may pursue any major as long as pre-dentistry prerequisite coursework is completed.

The College of Agriculture, Food and Environment offers support and guidance to students throughout the college interested in applying to dentistry school. In addition to outlining necessary coursework and guiding students through application processes, the college's pre-professional advisor also directs students to University programs, such as UK Education Abroad or the Center for Community Outreach, that foster well-rounded medical school applicants.

## MEET WITH AN ADVISOR

Pre-dental students should meet with a pre-professional advisor at least twice during their freshman/sophomore years and at least three times during their junior/senior years. Visit www.uky.edu/grow and click "Advising Resources" for instructions on setting up an appointment with the college's pre-professional advisor. Pre-dental students are also encouraged to attend pre-dental workshops, meetings, and events at the UK College of Dentistry each semester.

UK advisors work closely with advisors in the UK College of Dentistry. Visit mc.uky.edu/dentistry to learn more.

## DAT

The Dental College Admission Test (DAT) is a standardized, multiple-choice examination designed to assess problem solving, critical thinking, and knowledge of science concepts and principle prerequisites to the study of dentistry. Pre-dental courses in biology, general chemistry, organic chemistry, and physics should be taken prior to taking the DAT.

## CONNECT

Join the pre-med listserve to stay connected with pre-dental announcements. To subscribe, send an email message to listserv@lsv.uky.edu and type "SUBSCRIBE PRE-MED-L" in the body of the message.

College of Agriculture, Food and Environment

## PREPARE

The following is a general outline of dental school requirements (not including UK Core or major requirements):

**First Year**

- CHE 105 General Chemistry I / CHE 111 General Chemistry Lab I
- CHE 107 General Chemistry II / CHE 113 General Chemistry Lab II
- BIO 148 Principles of Biology I / BIO 155 Principles of Biology Lab I
- BIO 152 Principles of Biology II (may be taken first or second year)
- Mathematics as needed for major
  Suggested: MA 123 or MA 137 or MA 113

**Second Year**

- CHE 230 Organic Chemistry I / CHE 231 Organic Chemistry Lab I
- CHE 232 Organic Chemistry II / CHE 233 Organic Chemistry Lab II
- Upper division BIO class with lab

**Third Year**

- PHY 211 General Physics I *
- PHY 213 General Physics II
  **or**
  PHY 231 General University Physics / PHY 241 General University Physics Lab I
- PHY 232 General University Physics II / PHY 242 General University Physics Lab II

**UK and U of L's dental schools require 1 semester of physics*

**UK Dental School requires students to complete one semester of microbiology (BIO 208 or BIO 308) and one semester of biochemistry (BCH 401G), labs not required.** Pre-dental students are also strongly encouraged to complete coursework in statistics, psychology, and sociology.

Some dental schools have additional requirements beyond the courses listed above. These may include genetics, cell biology, immunobiology, histology, and cell biology. Students should reference the *Official Guide to Dental Schools* and specific dental school admission requirements. for more information.

## WHY OUR COLLEGE ?

In addition to pre-professional advising services, students in the College of Agriculture, Food and Environment connect with a variety of passionate faculty, staff, alumni and community organizations dedicated to meaningful, enriching experiences. These connections help students discover real-world applications to their studies and become well-rounded, competitive applicants for dental school.

While completing medical school requirements, past pre-dental students have been successful in majors such as Human Nutrition, Food Science, Animal Sciences, and Agricultural and Medical Biotechnology.

Lesli Hall, Pre-Dental Advisor
email: Lesli.Hall2@uky.edu | phone: (859) 257 - 3468

# PRE-PHARMACY ADVISING

At the University of Kentucky (UK), pre-professional programs are interest areas that students complete alongside their UK Core requirements and major curriculum. Students applying to the University of Kentucky College of Pharmacy may complete necessary coursework in two or three years. Students may also pursue any major as long as pre-pharmacy prerequisite coursework is completed.

The College of Agriculture, Food and Environment offers support and guidance to students throughout the college interested in applying to pharmacy school. In addition to outlining necessary coursework and guiding students through application processes, the college's pre-professional advisor also directs students to University programs, such as UK Education Abroad or the Center for Community Outreach, that foster well-rounded pharmacy school applicants.

## MEET WITH AN ADVISOR

Pre-pharmacy students should meet with a pre-professional advisor at least twice during their freshman/sophomore years and at least three times during their junior/senior years. Visit www.uky.edu/grow and click "Advising Resources" for instructions on setting up an appointment with the college's pre-professional advisor. Pre-pharmacy students are also encouraged to attend pre-pharmacy workshops, meetings, and events at the UK College of Pharmacy each semester. Students can meet with the UK College of Pharmacy pre-pharmacy advisor as needed by emailing sharon.gonzales@uky.edu

Lesli Hall, Pre-Pharmacy Advisor
Email: Lesli.Hall2@uky.edu
Phone: (859) 257-3468

## PHARMACY AT UK

Visit pharmacy.uky.edu to learn more about the University of Kentucky's College of Pharmacy, including featured events, current student testimonials and more.

College of Agriculture, Food and Environment

## PREPARE

The following is a general outline of UK College of Pharmacy requirements (not including UK Core or major requirements). Please note UK prerequisites may differ from other pharmacy schools:

- Biology + lab (1 semester) BIO 148 and 155
- Microbiology + lab (1 semester) BIO 208, 209 or BIO 308 + lab
- Human Anatomy (1 semester) ANA 209
- Physiology (1 semester) PGY 206
- General Chemistry + labs (1 year) CHE 105 & 111, and CHE 107 & 113
- Organic Chemistry + labs (1 year) CHE 230, 231 and CHE 232, 233
- Mathematics (1 semester - 1 year) MA 109 & MA 123 or MA 113
- Statistics (1 semester) STA 296 or BST 330
- English (1 year) WRD/CIS 110 and WRD/CIS 111
- Business (1 semester) ECO 201, ECO 202, ACC 201 or FIN 300
- Oral Communications (1 semester) WRD/CIS 110/111 or 112
- Electives: Enough hours to bring total to a minimum of 70 semester hours including the courses listed above

The following courses are also recommended, or required for some pharmacy school admission:

- Biochemistry, BCH 401G (reccomended pass/fail)
- Genetics, BIO 304
- Physics, PHY 211
- Other courses to consider: courses required by major, general education courses, dual degree prerequisites, healthcare-related courses such as public health, human health sciences, medical terminology, pharmacology and clinical leadership management courses

*Visit go.uky.edu/courses to see full descriptions of these University of Kentucky courses.*

## WHY OUR COLLEGE ?

In addition to pre-professional advising services, students in the College of Agriculture, Food and Environment connect with a variety of passionate faculty, staff, alumni and community organizations dedicated to meaningful, enriching experiences. These connections help students discover real-world applications to their studies and become well-rounded, competitive applicants for pharmacy school.

While completing pharmacy school requirements, past pre-pharmacy students have been successful in majors such as Human Nutrition, Food Science, Animal Sciences, and Agricultural and Medical Biotechnology.

# PRE-MED ADVISING

At the University of Kentucky (UK), pre-professional programs are interest areas that students complete alongside their UK Core requirements and major curriculum. Students may pursue any major as long as pre-med prerequisite coursework is completed.

The College of Agriculture, Food and Environment offers support and guidance to students throughout the college interested in applying to medical school. In addition to outlining necessary coursework and guiding students through application processes, the college's pre-professional advisor also directs students to University programs, such as UK Education Abroad or the Center for Community Outreach, that foster well-rounded medical school applicants.

## MEET WITH AN ADVISOR

Pre-med students should meet with a pre-professional advisor at least twice during their freshman/sophomore years and at least three times during their junior/senior years. Visit www.uky.edu/grow and click "Advising Resources" for instructions on setting up an appointment with the college's pre-professional advisor.

Lesli Hall, Pre-Med Advisor
Email: Lesli.Hall2@uky.edu
Phone: (859) 257-3468

## MCAT

The Medical College Admission Test (MCAT) is a standardized, multiple-choice examination designed to assess problem solving, critical thinking, and knowledge of science concepts and principle prerequisites to the study of medicine. Pre-med courses in biology, general chemistry, organic chemistry, social science, and physics should be taken prior to taking the MCAT.

## CONNECT

Join the pre-med listserv to receive information about upcoming events, club meetings, and tips and strategies for preparing for medical school. To subscribe, send an email message to listserv@lsv.uky.edu and type "SUBSCRIBE PRE-MED-L" in the body of the message.

College of Agriculture, Food and Environment

## PREPARE

The following is a general outline of medical school requirements (not including UK Core or major requirements):

**First Year**

- CHE 105 General Chemistry I / CHE 111 General Chemistry Lab I
- CHE 107 General Chemistry II / CHE 113 General Chemistry Lab II
- BIO 148 Principles of Biology I / BIO 155 Principles of Biology Lab I
- BIO 152 Principles of Biology II (taken 1st or 2nd year)
- Mathematics as needed for major
  Suggested: MA 123, MA 137, or MA 113
- UK Core Composition & Communication I & II

**Second Year**

- CHE 230 Organic Chemistry I / CHE 231 Lab I
- CHE 232 Organic Chemistry II / CHE 233 Lab II
- Upper division BIO class with lab

**Third Year**

- PHY 211 General Physcis I
- PHY 213 General Physics II
  or
- PHY 231 General University Physics / PHY 241 General University Physics Lab I
- PHY 232 General University Physics II / PHY 242 General University Physics Lab II

Pre-med students are also strongly encouraged to complete coursework in cell biology, biochemistry, statistics, psychology, and sociology. Some medical schools have additional requirements beyond the courses listed above. These may include genetics, immunobiology, microbiology, histology, and cell biology. Students should reference the Official Guide to Medical School Admission Requirements (MSAR) and specific medical school admission requirements for more information.

Visit go.uky.edu/courses to see full descriptions of these University of Kentucky courses.

## WHY OUR COLLEGE ?

In addition to pre-professional advising services, students in the College of Agriculture, Food and Environment connect with a variety of passionate faculty, staff, alumni and community organizations dedicated to meaningful, enriching experiences. These connections help students discover real-world applications to their studies and become well-rounded, competitive applicants for medical school.

While completing medical school requirements, past pre-med students have been successful in majors such as Human Nutrition, Food Science, Animal Sciences, and Agricultural and Medical Biotechnology.

# PRE-OPTOMETRY ADVISING

At the University of Kentucky (UK), pre-professional programs are interest areas that students complete alongside their UK Core requirements and major curriculum. Students may pursue any major as long as pre-optometry prerequisite coursework is completed.

The College of Agriculture, Food and Environment offers support and guidance to students throughout the college interested in applying to optometry school. In addition to outlining necessary coursework and guiding students through application processes, the college's pre-professional advisor also directs students to University programs, such as UK Education Abroad or the Center for Community Outreach, that foster well-rounded medical school applicants.

## MEET WITH AN ADVISOR

Pre-optometry students should meet with a pre-professional advisor at least twice during their freshman/sophomore years and at least three times during their junior/senior years. Visit www.uky.edu/grow and click "Advising Resources" for instructions on setting up an appointment with the college's pre-professional advisor.

## OAT

All optometry schools and colleges require applicants to take the Optometry Admission Test (OAT). The pre-optometry courses in biology, general chemistry, organic chemistry, and physics should be taken prior to taking the OAT.

## CONNECT

Join the pre-med listserv to stay connected with pre-optometry announcements and information sessions. To subscribe, send an email message to listserv@lsv.uky.edu and type "SUBSCRIBE PRE-MED-L" in the body of the message.

College of Agriculture, Food and Environment

## PREPARE

Students planning to apply to a school or college of optometry should use this sheet only as a guide. Each institution publishes its own school catalog which specifies its own requirements and procedures. It is essential that students obtain a catalog from the schools(s) or college(s) in which they are interested. The Association of Schools and Colleges of Optometry (ASCO) is an excellent resource, students considering optometry should become familiar with their website (opted.org).

The following is a general outline of dental school requirements (not including UK Core or major requirements):

- General Biology or Zoology *(1 semester-1 year)* BIO 148, 152, and 155
- Microbiology *(1 semester)* BIO 208 or BIO 308 and/or 209
- General Chemistry *(1 year)* CHE 105, 111, 107, 113
- General Physics *(1 year)* PHY 211, 213
- English *(1 year)*
- Calculus *(1 semester-1 year)* MA 123, 113, 132, or 137
- Statistics *(1 semester)* STA 296
- Psychology *(1 semester-1 year)* PSY 100

The following courses are also recommended or required for some optometry school admission:

- Physiology *(1 semester-1 year)* PGY 206, PGY 421G, or BIO 350
- Anatomy *(1 semester)* ANA 209
- Biochemistry *(1 semester)* BIO 401G

Some optometry schools have additional requirements beyond the courses listed above. Reference opted.org for the application information and deadlines.

## WHY OUR COLLEGE ?

In addition to pre-professional advising services, students in the College of Agriculture, Food and Environment connect with a variety of passionate faculty, staff, alumni and community organizations dedicated to meaningful, enriching experiences. These connections help students discover real-world applications to their studies and become well-rounded, competitive applicants for optometry school.

While completing medical school requirements, past pre-optometry students have been successful in majors such as Human Nutrition, Food Science, Animal Sciences, and Agricultural and Medical Biotechnology.

Lesli Hall, Pre-Optometry Advisor
email: Lesli.Hall2@uky.edu | phone: (859) 257 - 3468

# PRE-VET ADVISING

At the University of Kentucky (UK), students complete pre-vet course work alongside their UK Core requirements and major curriculum. Students may pursue any major as long as pre-vet prerequisite coursework is completed. Students frequently major in Animal Sciences, Equine Science and Management, or Agricultural and Medical Biotechnology. No matter the major or degree, pre-vet advisors are available to assist students through the veterinary school preparation process. Please visit www.uky.edu/pre-vet for more details.

The College of Agriculture, Food and Environment offers support and guidance to students throughout the college interested in applying to veterinary school. In addition to outlining necessary coursework and guiding students through application processes, the college's pre-vet advisors also direct students to university programs, such as UK Education Abroad or the Center for Community Outreach, that foster well-rounded veterinary school applicants.

## MEET WITH AN ADVISOR

Pre-veterinary students should meet with a pre-veterinary advisor at least once a semester. Visit www.uky.edu/pre-vet for details.

Colette Tebeau, Pre-vet Academic Coordinator
Email: Colette.Tebeau@uky.edu | phone: (859) 257-7551

Dr. Roberta Dwyer, Pre-vet Program Director
Email: rmdwyer@uky.edu | phone: (859) 218-1122

## CONNECT

All pre-vet students should sign up for the pre-vet listserv. Pre-vet advisors share vet school updates, scheduling details, employment opportunities, and application tips.

To subscribe to the pre-vet listserv, send a message to listserv@lsv.uky.edu. In the body of the text type: SUBSCRIBE UKPREVET-L yourfirstname yourlastname. Subscribers should use their uky email address.

College of Agriculture, Food and Environment

## PREPARE

While each of the 30 US veterinary schools have different prerequisite requirements, all demand a curriculum based on chemistry, biology, physics and liberal arts. Additionally, a robust GPA, high GRE score, professional recommendations, and extensive experience working with veterinarians are required for a competitive application. For details, visit the "Future Students" tab at www.uky.edu/grow and click "Browse Our Programs."

General Veterinary School Requirements*

- Principles of Biology with labs (8 hours)
- Fundamentals of Chemistry with labs (8 hours)
- Organic Chemistry with labs (6 hours)
- Biochemistry (3 hours)
- Physics with lab (4-8 hours)
- Upper Level Biology 300+ (9-12 hours)
- Written Composition/Speech (6 hours)
- Humanities/Social Science/Fine Arts (6-18 hours)
- Mathematics (3-6 hours)

**Requirements are school specific. Students are responsible for working with their UK pre-vet advisors to determine particular requirements.*

## UK PRE-VET CLUB

The UK Pre-Vet Club is open to all students interested in Veterinary Medicine. The club was created to help students with their undergraduate studies and to aid them in the selection of veterinary school upon completion of their requirements. Meetings throughout the year allow members to listen and exchange ideas and information about their classes and work experiences. Other activities include guest speakers, and field trips to Tennessee and Auburn Veterinary Schools.

## WHY OUR COLLEGE ?

In addition to pre-professional advising services, students in the College of Agriculture, Food and Environment connect with a variety of passionate faculty, staff, alumni and community organizations dedicated to meaningful, enriching experiences. These connections help students discover real-world applications to their studies and become well-rounded, competitive applicants for veterinary school.

While completing veterinary school requirements, past pre-vet students have been successful in majors such as Animal Sciences, Equine Science and Management and Agricultural and Medical Biotechnology.

For more detailed information, please visit

**afs.ca.uky.edu**

UNIVERSITY OF KENTUCKY
College of Medicine

# UNIVERSITY SCHOLARS

## *Program in AgBiotech & Medical Sciences*

**Medical Sciences Core Courses**

- IBS 602: Molecular Biology & Genetics
- IBS 606: Physiological Communications
- TOX 600: Ethics in Scientific Research

## Who Qualifies?

The University Scholars Program offers particularly gifted and highly motivated students the opportunity and the challenge of integrating their undergraduate and graduate courses of study in a single continuous program culminating in both a baccalaureate and a master's degree. The total number of hours for the combined program may be as many as 12 less than the total required for both the bachelor's and the master's degrees separately. The requirements for the bachelor's degree are unaffected.

## When Do I Apply?

An application to the program should be submitted at the end of the student's junior year. Applicants should have completed at least 90 credit hours of work toward the bachelor's degree, or be eligible for senior standing in the semester they are admitted to the program. The master's program should be in the field of the undergraduate major, and the undergraduate grade point average must be at least a 3.5 in the applicant's major field and 3.2 overall.


## How Do I Apply?

Applicants to a University Scholar's program must fill out and have signed a University Scholar's application which is available in The Graduate School Admissions Office as well as on our website. This form should be returned along with the standard Graduate School application form. The Dean of the Graduate School or his/her appointee will make admission decisions. Students must register in the Graduate School for all work taken following admission to the University Scholars' Program. University Scholars may take no more than 16 credit hours per semester, except by recommendation of their director of graduate studies and by approval of the Dean of the Graduate School.

**For More Information:**

Dr. Joe Springer

Email:

jspring@uky.edu

Website:

Graduate.med.uky.edu

Students must have an undergraduate advisor and a graduate advisor (in this case, the Director of Graduate Studies for the MS in Medical Sciences program). A jointly planned program must be prepared for each student and the required coursework and available electives for the MS in Medical Sciences component may be found on the website.

University of Kentucky®

TRANSFER PATHWAY

2018-2019

# ASSOCIATE IN SCIENCE FOR BACHELOR OF SCIENCE IN AGRICULTURAL AND MEDICAL BIOTECHNOLOGY

Completion of the following curriculum will satisfy both the requirements for an Associate in Science at KCTCS as well as UK Core requirements for the University of Kentucky and pre-major requirements for a bachelor of science degree in Agricultural and Medical Biotechnology.

KCTCS students planning to transfer to the University of Kentucky should work closely with the UK Transfer Advisor each semester to ensure both KCTCS and UK requirements are met.

| 1st Semester | |
|---|---|
| ENG 101: Writing I (3) | |
| CHE 170 + 175: General Chemistry I & Lab (5) | |
| MA 113, MAT 174, or MAT 175: Calculus I (4-5) | |
| *Social and Behavioral Science course (3) | |
| | |
| | |
| Semester Hours | 14-15 |

| 2nd Semester | |
|---|---|
| ENG 102: Writing II (3) | |
| CHE 180 + 185: General Chemistry II & Lab (5) | |
| Oral Communication course (3) | |
| BIO 150 or 114 + BIO 115, 151, or 155: Biology I + Lab (4-5) | |
| | |
| | |
| Semester Hours | 14-15 |

| First Summer Option | |
|---|---|
| Elective (3) | |
| | |
| Semester Hours | 3 |

| 3rd Semester | |
|---|---|
| BIO 152 or 116: Principles of Biology II (3) | |
| *Heritage course (3) | |
| CHE 270 + 275: Organic Chemistry I (4) | |
| *Social and Behavioral Science course (3) | |
| +Elective course (3) | |
| | |
| Semester Hours | 16 |

| 4th Semester | |
|---|---|
| BIO 226 + 209: Principles of Microbiology & Lab (4) | |
| STA 296: Statistical Methods and Motivations (3) | |
| *Humanities course (3) | |
| CHE 280 + 285: Organic Chemistry II (4) | |
| Digital Literacy course (3) | |
| | |
| Semester Hours | 17 |

Total Credit Hours: 61-63

Notes: *One course must satisfy the Cultural Studies requirement.
+Elective courses should be chosen in consultation with a UK Transfer Advisor and may be used to complete major or minor requirements.

**UNIVERSITY OF KENTUCKY COURSES ONLY**

| Second Summer Option | |
|---|---|
| Elective (3) | |
| | |
| Semester Hours | 3 |

| 5th Semester | |
|---|---|
| PHY 211 (5) | |
| ABT 360 (3) | |
| ABT 201 (1) | |
| SS-1 @ 300+ level (3) | |
| Elective (1) | |
| | |
| Semester Hours | 13 |

| 6th Semester | |
|---|---|
| PHY 213 (5) | |
| SS -2 @ 300+ level (3) | |
| 300+ level (3) | |
| ABT 301 (2) | |
| SS-3 @ 300+ level (3) | |
| | |
| Semester Hours | 16 |

| Third Summer Option | |
|---|---|
| Elective (1) | |
| | |
| Semester Hours | 1 |

| 7th Semester | |
|---|---|
| ABT 395 (3) | |
| BCH 401G (3) | |
| SS-4 @ 300+ level (3) | |
| SS-5 @ 300+ level (3) | |
| SS-6 @ 300+ level (3) | |
| | |
| Semester Hours | 15 |

| 8th Semester | |
|---|---|
| ABT 460 (3) | |
| ABT 461 (3) | |
| ABT 495 (3) | |
| SS-7 @ 300+ level (3) | |
| | |
| | |
| Semester Hours | 13 |

Total Credit Hours:

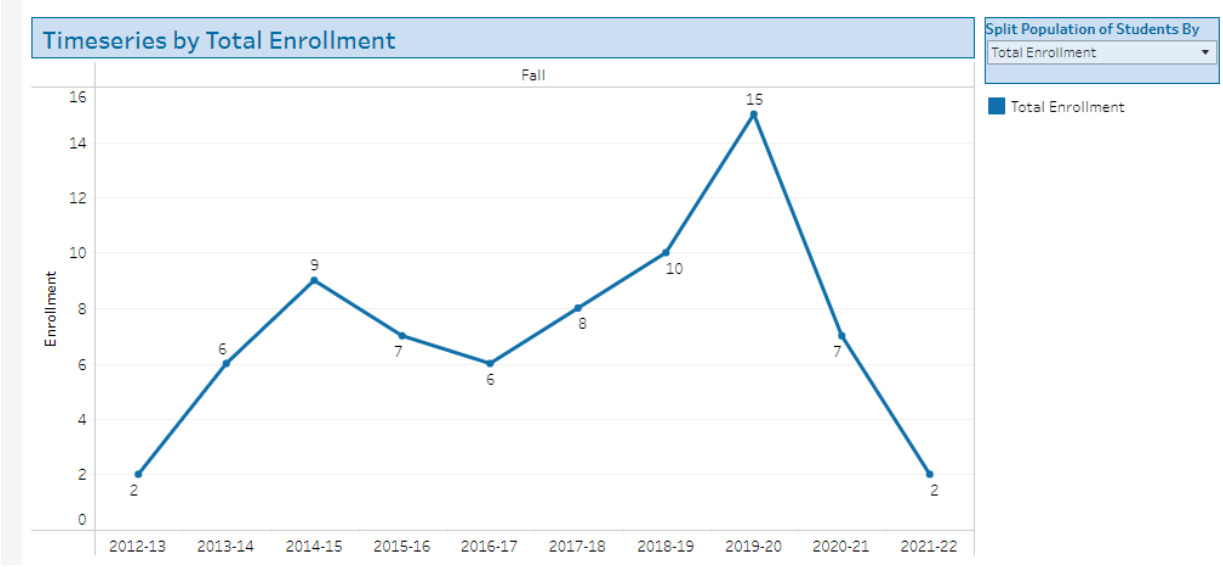
Notes:

*One course must satisfy the Cultural Studies requirement.

#Must earn a C or higher.

(Additional information).

Data below show transfers into the ABT program by academic year.  Note that the 2021-2022 data are incomplete.



## ABT Support Account

1012126170

- Source of funding comes from the College of Agricultrure, Food and Environment state appropriated funds
- The ABT Support Account supports the Academic Coordinator's salary, graduate assistant and student salaries, student awards and ABT program needs

| Fiscal Summary | Sum of YTD Actual | Column Labels | | | | | |
|---|---|---|---|---|---|---|---|
| | Row Labels | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 |
| Budget | Original Budget | 68,015.00 | 68,575.87 | 70,083.04 | 70,902.16 | 72,011.20 | 71,538.09 |
| | Change in Budget | 9,000.00 | - | - | 1,131.64 | 7,526.89 | 33.00 |
| | Fund Balance Return* | 2,500.00 | 2,271.00 | 2,439.00 | 4,327.10 | 2,540.00 | 10,593.00 |
| Payroll Expenses | Academic Coordinator | (52,539.96) | (53,153.37) | (54,608.04) | (55,427.16) | (56,536.20) | (56,536.20) |
| | ABT Admin Expense | (937.02) | (869.84) | (797.02) | (807.94) | (980.64) | (926.78) |
| | GA | (19,100.05) | 307.69 | (5,268.41) | (5,016.45) | | (7,615.35) |
| | Student | | | | | | (968.10) |
| Administrative Expenses | ABT Program Support | (4,362.28) | (14,437.14) | (6,190.46) | (10,854.28) | (11,949.52) | (7,605.16) |
| | AC Professional Development | (160.00) | | (926.31) | (1,528.76) | (649.20) | |
| | Student Awards | | (100.00) | (128.50) | (24.00) | (100.00) | (450.00) |
| | COVID 19-PPE | | | | | | (33.87) |
| | **Grand Total** | **$ 2,415.69** | **$ 2,594.21** | **$ 4,603.30** | **$ 2,702.31** | **$ 11,862.53** | **$ 8,028.63** |

*Previous year's ending balance (minus Provost and CAFE tax) transferred to current fiscal year

## ABT Course Fee Account

1013206190

- Source of funds are generate from ABT courses that have course fees associate with them.
  ABT 120 has had $50 fee. This course has been offered every spring semester.
  ABT 495 in FY16 and FY17 had a course fee of $100. Beginning in FY18 the course fee changed to $200. ABT 495 has been offer each semester.
- The course fee account supports the courses for which the fees were assessed to purchase necessary lab supplies and materials.

| Fiscal Summary | Sum of YTD Actual | Column Labels | | | | | |
|---|---|---|---|---|---|---|---|
| | Row Labels | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 |
| Revenue | Course Fee | 5585.00 | 4485.92 | 9407.68 | 9382.40 | 10913.00 | 12515.73 |
| | Fund Balance Transfer* | 2735.54 | 1212.04 | 328.77 | 3872.98 | 5696.24 | 2600.96 |
| Expenses | Course Fee Admin Expenses | (58.44) | (40.68) | (110.03) | (69.21) | (224.22) | (367.22) |
| | Course Related Expenses | (7050.06) | (5328.51) | (5753.44) | (7489.93) | (13784.06) | (10047.08) |
| | **Grand Total** | **$ 1,212.04** | **$ 328.77** | **$ 3,872.98** | **$ 5,696.24** | **$ 2,600.96** | **$ 4,702.39** |

*Previous year's ending balancen transferred to current fiscal year

| | FY16 | | FY17 | | FY18 | | FY19 | | FY20 | | FY21 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring | Fall | Spring |
| Course Fee | | | | | | | | | | | | |
| ABT 120 | | $ 50 | | $ 50 | | $ 50 | | $ 50 | | $ 50 | | $ 50 |
| ABT 495 | $ 100 | $ 100 | $ 100 | $ 100 | $ 200 | $ 200 | $ 200 | $ 200 | $ 200 | $ 200 | $ 200 | $ 200 |
| Enrollment | | | | | | | | | | | | |
| ABT 120 | | 25 | | 34 | | 60 | | 44 | | 57 | | 53 |
| ABT 495 | 21 | 17 | 18 | 6 | 20 | 11 | 21 | 14 | 21 | 18 | 34 | 14 |

## ABT Summer School Account

1012132140

- Source of funding is from net tuition revenue from ABT summer courses. Those course offered during the summers were ABT 395, ABT 369, and ABT 399
- 2016-2017 no summer school funds were generated due to no enrollment
- In 2019 and 2020 net tuition revenue funds were returned to the ABT program for the previous fiscal year's summer courses
- 2021 net tution revenue was not returned to the College due to major budget cut as a result of COVID 19.

| Fiscal Summary | Sum of YTD Actual | Column Labels | | |
|---|---|---|---|---|
| | Row Labels | FY19 | FY20 | FY21* |
| | ABT Fund Balance Return** | | 1682 | |
| | ABT Summer School NTR | 1790 | 460.34 | |
| | **Grand Total** | **1790** | **2142.34** | |

*FY20 fund balance has not been return to FY21 yet.
**Previous year's ending balance (minus Provost and CAFE tax) transferred to current fiscal year

| Enrollment | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 |
|---|---|---|---|---|---|---|
| ABT 395 | 0 | 0 | 2 | 0 | 1 | 6 |
| ABT 396 | Not offered | Not offered | 1 | 1 | 0 | 1 |
| ABT 399 | 0 | 0 | 0 | 0 | 0 | 0 |

University of Kentucky
College of Agriculture, Food and Environment

College of Agriculture, Food and Environment
Agricultural and Medical Biotechnology
Periodic Program Review
Site Visit Agenda
April 24 – 27, 2022

| Date: | April 24, 2022 |
|---|---|
| Day 1: | Sunday |

| | |
|---|---|
| 12:00 – 5:00 pm | Dr. Calie travels to Lexington and checks in at Campbell House Inn.<br>Dr. Field will join meetings remotely by zoom. |
| 6:15 pm | Designated local committee member transports Dr. Calie from Campbell House Inn to Frank and Dino's Restaurant (271 West Short Street) |
| 6:30 – 8:00 pm | Review Committee has dinner and working session at Frank and Dino's.<br>Group is joined by Program Director Dr. Luke Moe, Director of Undergraduate Studies Dr. Lou Hirsch, and Academic Coordinator Esther Fleming.<br>A local committee member returns Dr. Calie to Campbell House Inn. |

| Date: | April 25, 2022 |
|---|---|
| Day 2: | Monday |

| | |
|---|---|
| 7:30 – 8:30 am | Breakfast on own (Dr. Calie dines at Campbell House Inn) |
| 8:30 – 8:45 am | Committee travels to campus. Committee members who do not normally park on campus have reserved parking on the circle in front of Ag Science North facing Limestone Street. |
| 9:00 – 10:00 am | Meet with College of Agriculture, Food and Environment Dean Cox, Associate Dean for Faculty Resources, Planning and Assessment, Brian Lee.<br>Committee receives their charge from Dean Cox and Dr. Lee reviews rules and procedures, Ag Science North N-24B1. |
| 10:00 – 10:15 am | Break and walk to location TBD |
| 10:15 – 11:15 am | Meet Dr. Luke Moe and Esther Fleming in location TBD for a facility tour and discussion |
| 11:15 – 12:00 | Return to Ag Science North N-24B1 for committee reflection |
| 12:00 – 1:15 pm | Lunch with program students, Ag Science North N-24B, program faculty committee member recused. |
| 1:15 – 2:15 pm | Meet with AMBT Coordinating Committee, Ag Science North N-24B1 |
| 2:15 – 3:15 pm | Meet with ABT course instructors, Ag Science North N-24B1 |

| | |
|---|---|
| 3:15 – 4:45 pm | Committee working session and breaks as needed, Ag Science North N-24B1 |
| 4:45 – 5:00 pm | Walk to Plant Science Building to observe student recruitment event briefly on the way to dinner |
| 6:00 – 7:30 pm | Working dinner at Ramsey's Diner-Zandale for all committee members |

| | |
|---|---|
| Date: | April 26, 2022 |
| Day 3: | Tuesday |

| | |
|---|---|
| 7:30 – 8:00 am | Committee travels to campus (parking managed as with prior meetings) |
| 8:00 – 9:00 am | Working breakfast with review committee, Ag Science North N-24B1 |
| 9:00 – 10:00 am | Meet with AMBT research mentors, Ag Science North N-24B1 |
| 10:00 – 11:00 am | Meet with AMBT Academic Advisors, Ag Science North N-24B1 |
| 11:00 – 1:00 pm | Committee lunch and working session with breaks as needed, Ag Science North N-24B1 |
| 1:00 – 2:00 pm | Meet with Chairs of collaborating academic departments, Ag Science North N-24B1 |
| 2:00 – 4:00 pm | Committee working time and breaks as desired, Ag Science North N-24B1 |
| 4:00 – 5:00 pm | Break and travel to Campbell House Inn |
| 5:00 – 6:00 pm | Meet and greet with industry stakeholders and constituents, Campbell House Inn RackRoom Tavern |
| 6:00 – 7:30 pm | Working dinner at Campbell House Inn private dining room for all committee members, stakeholders not available for in-person meet and greet invited to join by zoom. |

| Date: | April 27, 2022 |
|---|---|
| Day 3: | Wednesday |

| | |
|---|---|
| 7:30 – 8:00 am | Committee travels to campus (parking managed as with prior meetings) |
| 8:00 – 9:30 am | Working session and breakfast, Ag Science North N-24B1 |
| 9:30 – 10:30 am | Meet with college leadership in Ag Science North N-24B1<br>Dr. James Matthews, Research<br>Dr. Carmen Agouridis, Instruction<br>Dr. Laura Stephenson, Extension<br>Dr. Orlando Chambers, Administration (facilities)<br>Dr. Brian Lee, Faculty Resources, Planning and Assessment<br>Dr. Mia Farrell, Diversity, Equity, and Inclusion<br>Brent McCauley, Philanthropy and alumni<br>Note- additional college administrators may be invited to attend if available at the committee's discretion. |
| 10:30am – 2:30pm | Committee working session with lunch and breaks as needed |
| 2:30 – 3:30 pm | Committee presents preliminary findings to leadership of the College of Agriculture, Food and Environment, Ag Science North N-24B1 |

Review Committee

| | |
|---|---|
| Dr. Mark Williams | Committee Chair and Chair of UK Department of Horticulture |
| Dr. Katherine Field | Oregon State University faculty |
| Dr. Patrick Calie | Eastern Kentucky University faculty |
| Dr. Vince Vinditto | UK Department of Pharmaceutical Sciences faculty |
| Dr. Layne Ellen Harris | Post Doctoral Research Fellow with Alltech and Alltech Crop Science—and alum of AMBT program and UK Integrated Plant and Soil Science Program |
| Dr. Nick Teets | UK Department of Entomology faculty and AMBT Program contributor |
| Ms. Hannah Cleary | Current AMBT Program student |

Support for Review Committee

| | |
|---|---|
| Dr. Brian Lee | 859-218-7991 |
| Tricia Coakley | 859-257-7041 (forwarding to cell when working off-site) |

University of Kentucky
College of Agriculture, Food and Environment

# UK Agricultural and Medical Biotechnology Program

## 2022 Periodic Program Review

Review Committee site visit April 24 - 27, 2022

## Review Report Submitted on May 17, 2022

Review Committee

| | |
|---|---|
| Dr. Mark Williams | Committee Chair and Chair of UK Department of Horticulture |
| Dr. Katharine Field | Oregon State University faculty |
| Dr. Patrick Calie | Eastern Kentucky University faculty |
| Dr. Vince Venditto | UK Department of Pharmaceutical Sciences faculty |
| Dr. Layne Ellen Harris | Post Doctoral Research Fellow with Alltech and Alltech Crop Science—and alum of AMBT program and UK Integrated Plant and Soil Science Program |
| Dr. Nick Teets | UK Department of Entomology faculty and AMBT Program contributor |
| Ms. Hannah Cleary | Current AMBT Program student |

**Executive Summary**

All reviewers concur that the Agricultural and Medical Biotechnology (AMBT) program offers significant value to the College, University, and State. The committee heard from students, advisors, faculty, research mentors, graduates, and stakeholders, all of whom enthusiastically praised the program. Specific aspects of the program that were judged to be particularly strong include: high-quality, motivated students; curriculum flexibility; an authentic mentored research project; highly motivated faculty with a sincere interest in student learning; inter-departmental and inter-college collaboration; well-planned courses that support all aspects of biotechnology and research; and strong preparation for future careers and graduate/professional programs in Biotechnology, Medicine, Pharmaceutical Sciences, Veterinary Sciences and the Food, Agricultural, Natural Resource, and Human (FANH) Sciences. Providing opportunities for student research, as this program does, is a high-impact educational practice that has been shown to increase retention of underrepresented students in STEM. The transdisciplinary nature of the program directly advances the goals of the University of Kentucky's Quality Enhancement Plan. Undergraduates in this program participate in research, and publish research papers, in trans-disciplinary fields. Finally, AMBT graduates comprise a well-trained job force, ready to take their places in cutting edge fields and areas of projected economic and job growth.

The AMBT program has grown to 236 students during the 2021-2022 academic year, now comprising the third-largest major in the college, yet compared to majors of comparable size, AMBT has very limited staffing and resources. Our committee identified several opportunities for growth and program enhancement, including opportunities for external funding, improved outreach to faculty in other colleges to provide more student research opportunities, improved coordination with graduate programs through enhanced articulation and development of University Scholars Programs, and development of an alumni network to enhance student professional development.

The most important challenges to AMBT identified by the Program Review Committee concern staffing and space. The resources of the single Academic Program Coordinator are currently stretched tightly, leaving little room for program growth and enhancement. Furthermore, the program does not have a physical location, leading to poor brand recognition and difficulties for students to obtain information and help. Some class sizes are limited because of limited teaching laboratory size or availability. The program also needs graduate teaching assistant support.

Our committee made recommendations for the AMBT program based on both the challenges and the opportunities we identified. Major recommendations are to add a second Academic

Coordinator, TA support, and office and teaching laboratory space. Further recommendations include, for example: introducing an annual advisor meeting to communicate advising resources and provide for advising uniformity; tweaking the AMBT courses to support finding mentors early, incorporate quantitative skills and biotechnology applications, enhance support and academic development of underprepared students; and revise the ABT course Learning Outcomes to ensure course consistency. We also recommend creating an alumni network and an industry advisory board.

In summary, the AMBT Program is a highly successful transdisciplinary education program that serves the University and State and supports the development of accomplished and successful graduates. To maintain its excellence and grow to serve more students, faculty, and stakeholders, it requires additional resources.

**Brief description of review committee process**

- Prior to the review, all committee members received and studied the Self-study Report submitted by faculty and staff of the Agricultural and Medical Biotechnology Program.
- The committee received their charge from Dean Cox, and Dr. Lee, Associate Dean for Faculty Resources, Planning and Assessment, conducted listening sessions with program faculty, staff, students, and stakeholders April 25 – 26.
- On Wednesday, April 27, the committee held working sessions and drafted talking points about the program's strengths, challenges, opportunities, and potential committee recommendations.
- Immediately following the working sessions, the committee presented draft recommendations to CAFE leadership.
- The Committee Chair, Dr. Mark Williams, worked with the committee to prepare this report, which all members of the committee have approved.

We begin this report with a brief list of program strengths, challenges, and opportunities that the committee observed through review of the self-study and listening sessions. This is followed by committee recommendations for the program to consider and act on over the upcoming six-year program review cycle. Throughout this report, the committee has noted specific UK Strategic Plan goals we feel the program's strengths, challenges, and opportunities are aligned with—as well as alignments found among our recommendations.

**Strengths**

- The independent research project is a hallmark of the ABMT program. Students are well prepared for the rigors of scientific research in their independent projects and also in their post graduate careers. Student research projects are in socially relevant areas such as aspects of food security and human health (University Strategic Plan Goals SF2, II1, II3)

- Interdepartmental and intercollegiate collaboration provides a variety of lab engagement options, allowing students to experience multiple research facilities and research foci in other colleges, including the College of Medicine, College of Arts and Sciences, the College of Agriculture, Food, and Environment, and the College of Pharmacy. Students are also well prepared for off-campus research opportunities at partner institutes and industries (e.g. - Alltech, Pioneer, DSM, local distilleries and distilling related research institutions). (SF2, SF3, II1, II2, II3)

- Curriculum flexibility: After taking the required science core courses, each student's upper-division curriculum is personalized to support the student's interests, research topic, and career goals. Students provided overwhelming positive feedback about this aspect of the program. (SF1, SF2, II1, II2)

- Courses are well designed and provide students with the knowledge and tools needed to conduct research, and critically assess experimental results. Writing and presentation skills are emphasized, developing critical scientific communication skills. (SF2, II2)

- Based on the experiences of prior students, graduates of the program are well-positioned to succeed in careers and graduate/professional programs. (II3)

- The program attracts academically talented, motivated and enthusiastic students who genuinely care about each other. Students are willing to look after each other in both an academic and social environment. This is made evident by the impact of the ABT Club and its regular activities that promote student success and camaraderie. (II1)

- Faculty have expertise and enthusiasm in their teaching areas and have sincere commitment to student learning. Faculty enjoy engaging the students in the learning process, work with students as learning partners, and are highly invested in student outcomes. (II2)

- AMBT students are of high value to the university. The program contributes to student participation in high-value educational practice (research) and provides research mentors with a trained and capable student workforce. (II1)

- AMBT students are of high value to the state. AMBT contributes a well-trained job force in cutting edge fields and areas of projected economic and job growth particularly beneficial for the commonwealth of Kentucky. This includes innovative agronomic advancement and biomedical research at partner institutions and industries important in Kentucky. (II1, II2, II3)

- Support given underrepresented students in college can have more impact on their persistence in STEM than their entering scores and related metrics. Mentored research is an excellent example of increased support through mentoring. Additionally, the strong, engaging and socially relevant AMBT programming contributes to retention of underrepresented students. (MPOC1, MPOC3)

- There is a very strong sense of community among the students, staff and faculty. At a large university like the University of Kentucky, it is possible for a student to feel adrift and isolated; this is particularly true for students moving to Lexington from rural areas of the state. ABMT provides a safe and welcoming "harbor" for these students. The investment of time and mentorship of research mentors through the independent project also provides an excellent opportunity for enhancing retention of under-represented or minority groups in the program. (II2, MPOC1, MPOC3)

**Challenges**

- There is a lack of staff to support the current program, and additional personnel support is critical to facilitate much needed engagement with stakeholders and tenable program growth.

- The program requires a commitment from departmental chairs (e.g. Entomology, Plant and Soil Science, Plant Pathology) to provide faculty for the AMBT Program.

- There is a need for larger teaching labs or additional course sections (and instruction capacity) in order to grow enrollment.

- AMBT lacks the structured resources typically available to departments.

- There is a perceived lack of research mentors for student 395 projects, and a lack of a codified system utilizing academic advisors to find a research mentor.

- Advising quality may not be equal across cohorts, and students mention a lack of continuity when advisers change.

- Both mentors and students reported a lack of clarity on expectations for ABT395, particularly with the indication that ABT395 is a single semester course. Codifying expectations for both students and mentors will assist in normalizing expectations.
- Lack of space is problematic in all areas of the program, including space for academic staff, classroom options, and laboratory teaching space. The program also lacks a central location identified as the "home" of AMBT.

- TA financial support is lacking due to the nature of the multidisciplinary program resulting in a financial burden on the affiliated departments. As the program grows, this will be an important issue to address, particularly with large laboratory courses and multiple sections.

- Some students enter the program under-prepared and either do not complete the program due to the outstanding rigor, or extend their time to graduation due to delay in completing required courses. (OP1)

- Students indicated a lack of consistency among different sections of the same course, taught by different instructors. There is a need for a "course coordinator" to provide equitable training across multiple sections.

- The majority of learning outcomes for courses, and some of the program learning outcomes, are not measurable. Some courses are missing learning outcomes entirely, and others have what appears to be objectives, not measurable outcomes. Most of the current outcomes would not be acceptable for university-level assessment.

- Students and faculty indicated that some students are not prepared for their research that involves bioinformatics and quantitative data analyses.

- There is a lack of connections with industry throughout Kentucky for students who want to do internships and eventually work in industry.

**Opportunities**

- Advocate for additional support from the university, as AMBT is ideally aligned with the UK Quality Enhancement Plan's emphasis on transdisciplinary education programs and should be well positioned to receive support. (II2)

- Given appropriate support from administration, grow the AMBT program to provide these excellent education and research opportunities for additional students and contribute to the university's emphasis on transdisciplinary education. (MPOC1)

- The biotechnology training and application to agriculture and medicine are key strengths of the program, and strategies are to introduce applied biotechnology (e.g. CRISPR/Cas9, genomic health data sets), bioinformatics (e.g. UNIX command) into the curriculum to support student trajectories beyond graduation from the program.

- Apply for an undergraduate training grant that leverages the program's excellent culture and infrastructure for undergraduate research. (II1, MPOC1)

- Develop University Scholars Programs that allow AMBT students to feed into other graduate and professional programs.

- Evaluate opportunities with in-state industry and partner institutions to identify paths for graduating students to advance their careers within the Commonwealth of Kentucky. (II2)

- Leverage the robust and high achieving AMBT alumni network for student mentorship opportunities and philanthropic outreach.

- Work with the UK Office of Philanthropy to identify a significant donation to endow the program.

- Emphasize Michael Goodin's legacy in the AMBT program, potentially by securing funds for a graduate assistantship or distinguished speaker series in his name. (MPOC3, MPOC4)

**Committee Recommendations**

1. Add a second staff academic coordinator for AMBT students and investigate opportunities for an AMBT office suite to clarify where students can access advisors and program leadership, and enhance program visibility and branding. The AMBT program shall work with the CAFE Office of Diversity to ensure equitable search practices in identifying and interviewing candidates for this position. (SF2, SF4, OP2, OP4, MPOC1)
2. Identify opportunities to increase TA lines for ABT Courses. (SF2, SF4, OP2)
3. Develop an Industry Advisory Board for AMBT Program to increase visibility among potential research mentors campus-wide and among private industry partners. (SF2, SF4, OP2, OP3, OP4, II1)
4. Develop an Alumni network organization for mentorship and professional development of current students (could work with ABT club). (SF1, SF2, SF4, OP2, OP3, OP4)
5. Develop University Scholars Programs with appropriate UK graduate programs. (SF2, SF4, OP2, OP3)

6. Codify articulation agreements and course alignments–and investigate Academic Common Market considerations–to enhance Farm to Pharm Program. (SF2, SF4, OP2, OP3, OP4)
7. Request college support to seek outside funding (philanthropic and governmental) for undergraduate education and research initiatives. Consider development of an external advisory board for establishment of undergraduate training program grants. (SF2, SF4, OP2, OP3, OP4, II1)
8. Host an annual advisor meeting to update advisors with current curricular and process details, make advisors aware of changes in scheduling, provide FAQ information, and provide professional development opportunities for advisors (including identification of mental health support resources for students and employees). (SF1, SF2, SF3, OP1, OP2, OP3, MPOC3)
9. Coordinate an annual all AMBT faculty and staff workshop/retreat to do the following (UK Strategic Plan all SF goals)(not necessarily in the same year):
    a. Update and assess consistency of course assessments and learning outcomes across ABT courses and sections. (SF2, OP2)
    b. Codify a standardized process for students to find research mentors early in the curriculum, and provide lab tours (maybe as part of ABT 101/201). (SF2, SF4, OP2)
    c. Identify ways to incorporate quantitative skills and modern biotechnology techniques and applications in the curriculum. (SF2, SF4, OP2)
    d. Develop opportunities for upper-division students to do peer-mentoring and lab instruction for credit. (SF2, SF4, OP2)
    e. Provide information for professional development opportunities in mental health support and DE&I dimensions. Collaborate with CAFE Office of Diversity for training materials and resources. (SF2, SF3, OP1, OP2, MPOC1, MPOC3)
    f. Identify and implement mechanisms to enhance support and academic development of underprepared students. (SF1, SF4, OP1, OP2)
10. Work with college administration to identify opportunities for including additional teaching lab spaces in new buildings where possible. (SF2, SF4, OP2, II3)

**Opportunities for college leadership consideration outside the purview of a single academic program.**

The College of Agriculture, Food and Environment is in a strong position to clarify and communicate support of university and state goals through methods used within multidisciplinary programs of the college, of which AMBT is an exceptional example. The

following are provided as potential talking points that may be useful in communication around AMBT impact on priorities expressed in university strategic planning, economic impact state-wide, and Quality Enhancement Plan reporting to the Southern Association of Colleges and Schools Commission on Colleges.

**Values of trans-disciplinary education**

The most pressing problems facing the world today involve food and water availability, sustainable energy, population health, environmental degradation, and climate change. These are all trans-disciplinary problems, and solutions must be crafted at the intersection of disciplines. The AMBT Program embodies a trans-disciplinary approach to education and problem solving. The involvement of faculty from multiple departments and colleges, partnerships with stakeholders in industry, and the integration of curriculum and research, exemplify a well-designed and successful approach to trans-disciplinary education.

**High-impact educational practices**

The AMBT curriculum specifically integrates high impact educational practices, including instruction in science process skills and literacy, and student research. Participation in research has been shown to improve students' academic performance and persistence to graduation, give them a greater sense of integration into the academic community, and raise the likelihood of enrollment in graduate and professional school. Early integration into the academic community—"becoming a scientist"—is a strong predictor of student success. Research mentors of AMBT students all commented favorably on how AMBT students entering their laboratory programs already thought like scientists, and were therefore well prepared for scientific research.

Research opportunities, an engaging and socially-relevant curriculum, and social/mentoring support have been identified as critical factors for recruiting and retaining minority students in STEM. With its focus on building a strong academic community, early involvement in research, student research that addresses socially-relevant problems, and the increased mentoring that comes with participation in a mentored research project, the AMBT program already has the infrastructure needed to attract and retain minority students. With the addition of thoughtful social mentoring and appropriate academic support, the established practices of the AMBT program will result in highly successful graduation rates of underrepresented minority students, and the program is positioned to be very competitive for external education grants.

# UK Program Review Implementation Plan

*This **required** form is described as Appendix A in AR II-I.0.6.*

**College/Unit:** *AMBT* **Date: 10/11/2022**

| Recommendation/ Suggestion | Source I/E/H* | Accept/ Reject** | Unit Response (resulting goal or objective) | Actions (including needed resources) | Time Line |
|---|---|---|---|---|---|
| 1. Add a second staff academic coordinator for AMBT students and investigate opportunities for an AMBT office suite to clarify where students can access advisors and program leadership, and enhance program visibility and branding. The AMBT program shall work with the CAFE Office of Diversity to ensure equitable search practices in identifying and interviewing candidates for this position. (SF2, SF4, OP2, OP4, MPOC1) | **E** | **Accept** | The AMBT Steering Committee agrees that the addition of a staff member and office suite are needed to support program growth and sustainability, but financial resources do not exist within the program to accomplish this at this time. We will work with college administration to identify resources and opportunities available outside the program to achieve these goals. | We will work with college administration to identify opportunities/resources to (1) increase staff capacity with a lens towards diversity and in consultation with the college's Office of Diversity, and (2) identify a singular grouping of AMBT office spaces in a highly visible location. | Year 1 |
| 2. Identify opportunities to increase TA lines for ABT Courses. (SF2, SF4, OP2) | **E** | **Accept** | To establish additional TA lines dedicated for the program. | We will work with college administration to identify opportunities for TA support for departments with faculty and staff participating in the AMBT program (e.g., Horticulture, Plant and Soil Science, Entomology, Plant Pathology, and Veterinary Science. | Year 2-3 |
| 3. Develop an Industry Advisory Board for AMBT Program to | **E** | **Accept** | To develop an Industry Advisory Board | The AMBT Steering Committee will develop a plan for developing an | Year 1-4 |

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| increase visibility among potential research mentors campus-wide and among private industry partners. (SF2, SF4, OP2, OP3, OP4, II1) | | | | Industry Advisory Board. The plan will consider aspects such as nominations, governance, communications, fundraising, and intentional engagement. | |
| 4. Develop an Alumni network organization for mentorship and professional development of current students (could work with ABT club). (SF1, SF2, SF4, OP2, OP3, OP4) | **E** | **Accept** | To develop an Alumni Network so that the current students can link to our alumni for mentorship and professional development | We will establish a sub-committee under the AMBT Steering Committee to promote alumni engagement, and we will work in consultation with the college's Office of Philanthropy. | Year 1-4 |
| 5. Develop University Scholars Programs with appropriate UK graduate programs. (SF2, SF4, OP2, OP3) | **E** | **Accept** | To develop University Scholars Programs with IPSS and IBS. | We will work with the leadership of IPSS and IBS to establish a University Scholars Program. | Year 1-4 |
| 6. Codify articulation agreements and course alignments–and investigate Academic Common Market considerations–to enhance Farm to Pharm Program. (SF2, SF4, OP2, OP3, OP4) | **E** | **Accept** | To develop Farm to Pharm Program. | We will work with college administration to establish the Farm to Pharm program with the College of Pharmacy. | Year 1-4 |
| 7. Request college support to seek outside funding (philanthropic and governmental) for undergraduate education | **E** | **Accept** | 1. To obtain external funding to support AMBT program activities.<br><br>2. To develop an Industry Advisory Board. | We will work with college administration and our newly established Industry Advisory Board to explore opportunities to generate external funding to support the AMBT program. Such funding | Year 1-4 |

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| and research initiatives. Consider development of an external advisory board for establishment of undergraduate training program grants. (SF2, SF4, OP2, OP3, OP4, II1) | | | | opportunities may be philanthropic or competitive in nature. | |
| 8. Host an annual advisor meeting to update advisors with current curricular and process details, make advisors aware of changes in scheduling, provide FAQ information, and provide professional development opportunities for advisors (including identification of mental health support resources for students and employees). (SF1, SF2, SF3, OP1, OP2, OP3, MPOC3) | **E** | **Accept** | 1. To host an annual advisor meeting. | We will set up an annual advisor/instructor meeting to update the advisors with current curriculum and academic schedules, to discuss opportunities available on campus for mental health support, and to provide a dedicated time for FAQ. | Year 1-2 |
| 9. Coordinate an annual all AMBT faculty and staff workshop/retreat to do the following (UK Strategic Plan all SF goals)(not necessarily in the same year):<br>a. Update and assess consistency of course assessments and learning outcomes across ABT | **E** | **Accept** | 1. To host an annual faculty and staff workshop/retreat. | Related to the Recommendation No. 8, We will set up an annual advisor/instructor meeting to update the instructors.<br>a. We will collect syllabi and grades from all AMBT courses and sections and assess consistency. If needed, we will work to make all sections more balanced.<br>b. We will communicate with the instructors of the AMBT introductory | Year 1-4 |

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| courses and sections. (SF2, OP2)<br>b. Codify a standardized process for students to find research mentors early in the curriculum, and provide lab tours (maybe as part of ABT 101/201). (SF2, SF4, OP2)<br>c. Identify ways to incorporate quantitative skills and modern biotechnology techniques and applications in the curriculum. (SF2, SF4, OP2)<br>d. Develop opportunities for upper-division students to do peer-mentoring and lab instruction for credit. (SF2, SF4, OP2)<br>e. Provide information for professional development opportunities in mental health support and DE&I dimensions. Collaborate with CAFE Office of Diversity for training materials and resources. (SF2, SF3, OP1, OP2, MPOC1, MPOC3)<br>f. Identify and implement mechanisms to enhance support and academic | | | | courses so that these courses have sessions to explain students how to find research mentors as well as lab tours.<br>c. We will communicate with all AMBT course instructors to add practices on quantitative calculations.<br>d. We will establish a peer instructor course to support high enrollment courses such as ABT 120.<br>e. We will communicate with the college to obtain the materials related to professional development opportunities and provide the information to the AMBT faculty and staff members.<br>f. The academic coordinator will work with underprepared students to support their academic development. | |

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| development of underprepared students. (SF1, SF4, OP1, OP2) | | | | | |
| 10. Work with college administration to identify opportunities for including additional teaching lab spaces in new buildings where possible. (SF2, SF4, OP2, II3) | **E** | **Accept** | To obtain an additional molecular biology lab space more suite for ABT 120, ABT 361, and ABT 495. | We will work with college administration to identify opportunities for establishing additional teaching lab spaces in new facilities and renovating spaces in current facilities. | Year 1-4 |

* **Source of Recommendation (I = Internal recommendation; E = External Review Committee recommendation; H = Unit Head recommendation)**

** **Accept/Reject Recommendation (A=Accept; R=Reject)**

**Unit Head Signature:** _____ **Unit Head Supervisor Signature:** Carmen T. Agouridis **Date:** 12.01.22