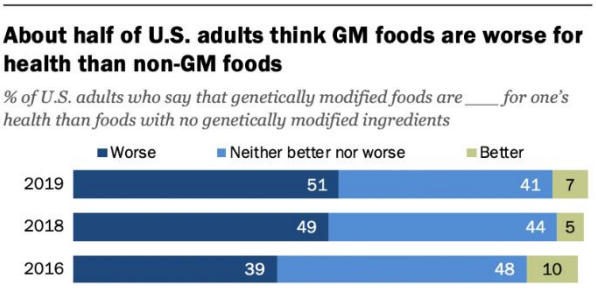
GEN ED COURSE ENHANCEMENT GRANT COMPETITION 2021-2022

1. Proposer Name(s) and Academic Title(s): **X. Cindy Tian, Professor of Biotechnology**
2. Email Address(es): **xiuchun.tian@uconn.edu**
3. Is this a new course or a currently existing course? **New Course**
4. List the course title and course number of the proposed/enhanced course and name of the sponsoring department or program.

   Everyday Biotechnology, AnSc 2XXX Animal Science

5. Describe your project and the work that will be done during the grant period on course content, course design, and/or teaching approach. Provide a clear statement of the objectives of the project in terms of student learning.

Project: *Biotechnology is the study of utilizing a biological process for production or commercialization. A traditional biotech example is making of wine using the biological process of yeast fermentation. However, today's biotech is "high-tech" such as genetic engineering, aka, GMO (genetically modified organism). Even engineering an organism's genetic makeup has won the Nobel Prize twice (2007 and 2020) and produced enormous benefits to research, human medicine, animal health, consumers, producers, food security and the environment, it is increasingly misunderstood and rejected by the general public. The Pew Research Center demonstrated that in 2019, 51% of US adults believe GMOs are bad for their health, a 12% increase from 2016 (see Figure). Additionally, as high as 92% of the people surveyed failed to recognize the benefits of GMOs (only 7% believe GMOs are better). These negative views are in stark contrast to the conclusion of the hundreds and thousands of scientific publications. The foundation of this misunderstanding is the lack of science-based information that is comprehensive and widely available to the general public. Unfortunately, scientific literature has become a language of its own and is completely ineffective in conveying science to laymen. At the same time a small yet very vocal anti-GMO group continues to create misinformation and their relentless efforts have resulted in a wide-spread resistance to a very beneficial technology. While all forms of biotechnology are misunderstood to certain degrees, genetic engineering is the one most misconstrued. This is a dangerous trend because we are ripping the benefits and living with biotechnology every day. For example, 31% of Americans are still not vaccinated for even one dose of COVID 19. The GMO fear and COVID vaccine hesitancy/resistance are good exhibitions of biotechnology skepticism and should call for general education.*



As a biotechnologist, I feel the need to bring scientific facts to the masses. I realized that no matter how beautiful a biotechnology is, if the public do not understand it and therefore rejects it, it has no place in the society. I have been teaching AS3323 (Animal Embryology and Embryo Biotechnology) to Animal Science majors since 2002. AS3323 focuses on the technical and methodological aspects of biotechnologies related to mammalian embryos as well as embryonic development. Students commented that after the course they truly comprehend and appreciate biotechnologies. The course attracts an average of 30-40 students/semester due to its specialty.

Work to be done: *I aim to start a new course open to all undergraduate students with a goal of enrolling **150** students per semester so more students will have science-based information delivered to them in an understandable fashion. Because I will teach biotechnology to mostly non-biology majors I cannot make simple revisions to AS3323. The new course will not focus only on animal related biotechnologies. I will add new biotechnologies such as genetic engineering in microbiology, molecular biology and human medicine (gene therapy or GMO humans). While some biotechnologies taught in AS3323 such as cloning and stem cells will be retained, the depth of information need to be modified and complex/boring technical details removed. The course will focus on basic yet comprehensive information that even non-biology majors will obtain a working understanding of. The new course will cover: 1) what are the common biotechnologies that we are already using everyday and what are those that are being developed? 2) why are such biotechnologies created? 3) how are these biotechnologies different and better than conventional technologies that have been used for years, decades or even centuries? 4) what are the benefits of these biotechnologies to end users, consumers, producers, wildlife, scientific discovery and the environment? 5) what are myths and misunderstanding of the biotechnologies and their societal impacts? Where to find science-based information and how to use them to distinguish facts from myths? 6) what are the challenges for the development, approval, and implementation of the biotechnologies? and 7) what are the directions of further advancements of biotechnologies?*

My past experience of gradually incorporating plant GMOs in my Animal Science class in the past two to three years was very successful and will be used as a model to make all sections to be covered (Biotechnologies in Molecular Biology, Microbiology, Genetic Engineering in Plant Science, Animal Husbandry, Laboratory and Marine Animals as well as Humans, Human In Vitro Fertilization, Somatic Cell Nuclear Transfer or Animal Cloning, and Stem Cells), interesting and easy to understand for students of all majors. As a result, approximately 60-70% of the course materials will be new or need to be modified. New assessment tools of student discussion will also be introduced in a large class setting. One third of the new course will be spent on students' active participation in the forms of storytelling, team Socratic seminars and/or developing sciences bowls/Jeopardy (see below) using science-based information that they researched.

6. How do you intend to evaluate project objectives once the course, as proposed, is offered? Please identify intended learning outcomes and assessment tools.

The course will use three to four new tools of assessment: 1) concurrent in-class quiz, 2) storytelling, 3) team Socratic seminar debates, 4) science bowl/Jeopardy development, together with a traditional open book final exam. Daily quiz (28 total) will be concurrent with the lecture. After a concept is described, students will immediately answer a quiz question related to that concept. Such questions will be implemented throughout the entire lecture so students will enhance their learning and test their comprehension right away. It will also help attention and attendance. The third meeting per week of the new course will be devoted for students to present results of their own research such as tell a story or to give a product example of a biotechnology. Storytelling/myth-debunking, Socratic seminars and science bowl/Jeopardy are new tools that I will develop during the summer with the help of this grant. I will need to consult colleagues at UConn and UC Davis who implement such pedagogy tools in large classes. I will need to develop all topics for debates and inclusion. Due to the contentious nature of many biotechnologies, the internet will be full of myths and factoids. Students will be taught on how to distinguish myths from facts and where to find science-based information. Pending class size, student discussion may be repeated, may be in groups and led by me and the TAs. Teams will be assigned opposing views, search for support and debate in class.

7. Describe how the course will fit into UConn's General Education curriculum. How will the course serve the broad goals of UConn's General Education program (flexibility in thinking, foundations for learning at UConn and later in life, critical analytical skills, etc.)?

Students are already using many forms of biotechnology everyday. They will also be the main users of new biotechnologies of the future. A broad and coherent body of knowledge and contemporary scientific information on biotechnology is a necessity for daily decisions such as should I eat GMOs. While GMO is used as an example here, it is not the only biotechnology feared by the public or taught in this course, I will cover many biotechnologies that we use every day. Through learning the scientific data and evaluating the impact of these technologies on themselves, their contemporaries, the human society and the environment, students will be at a good position to assess technological developments just like students in AS3323 did. Not only will the students be given such information, but they will also actively participate in finding and presenting related real live experiences of themselves or others. They will have to sort out myths from truths. The critical skills of curiosity for truth (among myths) and the ability to make data-supported arguments will be theirs to use in other aspects of life. The goal of the course is not to convert anyone who does not like biotechnologies. Instead, the goal is to provide science-based information about these biotechnologies so people have better basis for their evaluation and decisions.

8. Describe how the course meets the specific criteria for the given priority areas of this year's competition (EL, JEDI).

Most biotechnologies related to animal husbandry and plant science are developed for environmental sustainability because agriculture is a huge burden to the environment. For example, genetically engineered disease-resistant animals will reduce the use of antibiotics and other pharmaceuticals (not to mention the reduction of animal suffering). Insecticide-resistant

crops incorporate a natural insecticide commonly used in organic farming and reduced chemical insecticide use by 37% in the US alone. Cloning of the black-footed ferret has increased the genetic diversity of this endangered species. The environmental impact of biotechnologies and benefits to consumes/producers, human health, wildlife (One Health) is a major focus of the course. Students will actively find and present such information through true stories, Socratic debates and contest development. They will also be shown and asked to use tools of dialogue to respect fellow students and different views.

9. Describe how the course will fit into the general education plan for any departments involved in its development.

Our department is deficient in General Ed class offering even though the safe production of food animals and the safety of meats are of concern to everyone in the society. It is therefore our goal to make the information available to all members of the undergraduate student body. The avoidance of technical details of biotechnology will allow all students to have comprehensive information on biotechnology, not just animal science majors. Students in Animal science will also benefit the learning of a wider content. Technical details of animal biotechnologies will be taught at the graduate level for which advanced undergraduate students can partake.

10. For which content areas (CA1-4), competencies (W, Q), or literacies (Environmental – E) will the course be proposed and how will it address the specific criteria for courses in these content areas and/or competencies?

CA3: the course contains mainly Science and Technology information
E: the environmental impact of plant and animal biotechnology is a main focus of these sections.
Information Literacy Competency: students will gather, organize, and present facts and debunk myths.

11. How will the course add to and/or enhance existing course offerings? Does the course fill other important curricular gaps? How does it compare to current offerings or pedagogy? What will be distinctive about the course?

This will be a completely new course of its kind on campus and it fills a curricular void of introductory level biotechnology. I have spoken to a few biotech colleagues at other universities and they don't have such a course either. My old technical course limited to biotechnologies in embryos (AS3323) will not be taught if I offer this new course. While bits and pieces of a specific biotechnology may be taught in a specialty class within a particular major, a generalized introductory level biotechnology course suitable for students of all majors is not available at UConn or any other university that I know of. What is distinctive about this new course is 1) its breadth: biotechnologies related to plants, animals, humans, microbiology, molecular biology will all be included at a general and introductory level, and 2) it delves into the society's perception, misunderstanding and impact.

12. Why are you the most qualified person/team to teach this course? If this is not your primary field of study, what resources will you use to help you develop this course?

The breath of this new course requires an instructor who has knowledge of diverse subjects. While teaching AS3323 during the past 19 years, I have paid special attention and purposely learned and gradually incorporated basic introductory materials of GMO plants to Animal Science students. This was a major success as shown by students' comments. I will use this model for other forms of everyday biotechnologies in the new course. About 30% of the basic information from AS3323 will be retained and the rest will be new and to be developed. While new forms of biotechnologies such as those in microbiology (using bacteria to produce insulin and other pharmaceuticals) and gene therapy (GMO humans and stem cells) will be new to the class but they follow similar principles of animal biotechnology which is my expertise. I personally conduct research in multiple areas of the course including genetic engineering of DNA/RNA, microorganisms and laboratory/farm animals, stem cells, cloning and in vitro fertilization. I will consult with colleagues who teach large classes and implement group discussion/projects. I regard myself the most suitable/qualified person to teach this new course. This course will also be required for the CAHNR's Biotech Minor. The Biotech Minor committee have been urging me to make this a Gen Ed course so it is available to students of all majors.

13. Will your course serve as a model to assist others in their efforts to improve the general education curriculum? If so, how?

The development of a Gen Ed course that is "useful" in everyday life should be a main goal of our education efforts. To this end, this new course should be a model because it will teach students to use data and to make tangible decisions such as what to eat and what medical action to take. Additionally, I believe my concurrent in-class quiz is valuable in any class. Furthermore, the Socratic seminar and storytelling discussions can be very useful in the teaching of controversial and societal impactful subjects.

14. Is your proposal linked to any others being submitted in this competition? **No**

15. Has this course even been submitted for this grant in the past? **No**

16. Has this course been funded ***by this grant*** in the past? **No**

17. Funded ***by any other non-departmental source***? **No**

18. If you answered "Yes" to questions 13 or 14, please explain why the additional changes and funding are needed to further enhance this course. **N/A**

19. Complete the Budget Form: **Attached**

20. ***For new courses***, syllabus, preliminary reading list, assessments **Tentative syllabus attached.** Details for many items such as reading list and assessment need to be developed.

21. Arrange for your program director/department head to email a statement of support. **Sent**

ANSC 2XXX, Everyday Biotechnology
Fall 2022 Syllabus

Course Description

This course provides an **introductory level, yet comprehensive overview of biotechnologies that we use every day as well as emerging biotechnologies of the future.** Seven major sections are included:

1) Biotechnology in molecular biology (such as DNA/RNA recombinant technologies, new mRNA vaccines, etc.)
2) Biotechnology in microbiology (such as production of pharmaceuticals and antimicrobials by microorganisms)
3) Genetic engineering (GMO), traditional transgenesis and new CRISPR technology
4) Gene- and cell-therapy (GMO humans), xenotransplantation (transfer tissue/organ between species)
5) *In vitro* production of embryos ("test tube babies" or simply "*in vitro*"; how postponement of reproduction by women of modern societies made this technology for common use, social sexing, pre-implantation genetic testing to illuminate genetic defects, etc.)
6) Somatic cell nuclear transfer (cloning) and its applications
7) Stem cells (embryonic, adult and induced stem cells, current state of development, problems and promises)

The course will encompass applications of biotechnology in many different species including humans, plants and animals (marine, laboratory and farm animals), as well as microorganisms. Basic concepts in genetics, genomics, and epigenetics will be reviewed and utilized throughout the semester.

Objectives and Goals

You will be learn:

1) what are the common biotechnologies that we are already using on a daily basis and what are those that are emerging?
2) why are such biotechnologies developed?
3) how are these biotechnologies different and better than conventional technologies that have been used for years, decades or even centuries?
4) what are the benefits to end users/consumers, producers, and the environment?
5) what are myths and misunderstanding of the biotechnologies and their societal impacts? How to use scientific data to distinguish facts from myths? Where to find science-backed information on biotechnologies?
6) what are the challenges for the development, approval, and implementation of the biotechnologies? and
7) what are the directions of further advancements of biotechnologies?

After taking this course, you will be able to:

1) explain to the general public with confidence all forms of biotechnologies discussed in class,
2) learn how to obtain science-backed data and support your arguments on biotechnology, and
3) have an expanded view of the field of biology and potentially incorporate biotechnology in your career development.

Course and Instructor Information

General Education class: satisfies the Science and Technology Content area, enhances environmental competence, 3 credits

Instructor: Prof. X. Cindy Tian, (860) 486-9087, Xiuchun.Tian@uconn.edu, Advanced Agricultural Labs 220D

Teaching Assistants: TBA

Classroom/Time: TBA, MWF: 50 min each meeting

Office Hour: immidately before and after class, or by email for appointments

Pre-requisite

BIOL1102 or BIOL1107 or equivalence. Special permission may be given by instructor.

Course Materials

There is no textbook due to the diverse areas covered in the class. Class slides with sufficient diagrams and texts will cover all information given. Supplemental reading materials will be from online sources and posted on HuskyCT. Due to the fast-pace of biotechnology development, the supplementary reading list may change during the semester if a new development is published.

A reference book is required reading and used for reflections as some of the homework

"Seeds of Science - how we got it so wrong on GMO" by Mark Lynas
https://www.amazon.com/Seeds-Science-Why-Wrong-GMOs/dp/1472946987

Examples of supplementary reading (more will be developed):

GMO：

Opposed to G.M.O.s? How Much Do You Know About Them? - The New York Times (nytimes.com)
How Much Do You Know about COVID-19 Vaccines? | CDC
Agricultural Biotechnology | FDA
Food Loss and Waste | FDA

Gene, Cell Therapy, xenotransplantation

Pioneering Gene Therapy Freed Her of Sickle Cell. Is a Cure at Hand? - The New York Times (nytimes.com)
Gene Therapy Platform for Rare Diseases | National Center for Advancing Translational Sciences (nih.gov)
Genetic Therapies | NHLBI, NIH
https://wwwnc.cdc.gov/eid/article/2/1/96-0111_article

Cloning and species preservation

Cloning boosts endangered black-footed ferrets | Science News for Students
https://reviverestore.org/projects/black-footed-ferret/
Wisely et al. A Road Map for 21st Century Genetic Restoration: Gene Pool Enrichment of the Black-Footed Ferret. *Journal of Heredity*, 2015, 581–592.

IVF (preimplantation genetic diagnosis, sperm sorting)
https://www.cdc.gov/art/index.html
https://www.ucsfhealth.org/treatments/pre-implantation-genetic-diagnosis
https://www.microsort.com/

Stem Cells
Introduction to Stem Cells | STEM Cell Information (nih.gov)

Assignments

In-class Quizzes*:* Concurrent with all lectures. 28 in total, 15 points each, given as the class progresses and are open book. For example, after a concept is introduced, a question is immediately asked and to be answered on the quiz. Format will be multiple choices, fill-in blanks, true/false, short answers (a phrase, a few key words, or one or two sentences). Some questions will be in the forms of diagrams.

Homework*:* 12 total and 15 points each, due in a week and submitted on HuskyCT. "Short" answers (5-6 sentences) and half-page reflections from reading the Chapters 1-6 of the reference book by Mark Lynas.

Storytelling*:* Each student may do one or two 5-min storytelling pending class size. Write/copy a story (no more than a page) of an application or a product of a biotechnology, submit on HuskyCT (30% of the storytelling grade). Topics and format to be developed. The class will be divided to groups or 30 students or fewer for this activity. Sign-up sheets will be available at the first day of class. Presentation will be graded for relevance, clarity, correctness of information and enthusiasm (score sheets will be provided, sample forms are shown below).

Storytelling Evaluation Form

Speaker _____ Date _____

Relevance?	poor	OK	good	great
Interesting?	poor	OK	good	great
Clarity, enthusiasm	poor	OK	good	great
Incorrect statements	Yes/No	***Overall score*** _____		

Storytelling Evaluation Form

Speaker _____ Date _____

Relevance?	poor	OK	good	great
Interesting?	poor	OK	good	great
Clarity, enthusiasm	poor	OK	good	great
Incorrect statements	Yes/No	***Overall score*** _____		

Socratic seminars*:* teams of 5 students giving/holding opposing views of each technology will be formed, a topic is assigned or chosen by the teams, a PowerPoint file with 5 slides each team should be developed using data/facts, scientific literature, submitted and debated in class. Slides should be submitted via HuskyCT (30% of Socratic Seminar grade). Each student will be in one team during the semester and must work with other team members who will grade each other's contributions. Be respective and use dialogue skills. The class will be divided into two groups for this activity. Sign-up sheets will be available three weeks before the first Socratic seminar. **Debate topics, evaluation criteria and score sheet are to be developed during the summer**.

Science bowl/Jeopardy: Teams of students may also choose to develop contest questions using class materials or information from online sources. Pending class size, students may choose either Socratic seminar or contest development. **The specifics of the requirements need to be developed**.

Final exam: Open book but not take-home given during exam period as scheduled by the University. The format is the same as the quizzes but may contain analytical questions such as those practiced in

the Socratic seminars. *It is the philosophy of this instructor that students no longer need to memorize information because everything is at their fingertips. They just need to know what information is out there and how to find the right information. Both of these will be taught in this course.*

Late submission: Grades for all late work will be reduced by 50% per tardy day.

Make-ups: Only given if pre-arranged AND with a third-party written excuse such as a medical professional or a coach's note. There will be no make-up for any reason for the team Socratic seminar debates or storytelling because you can choose the time of presentation.

Tentative Grade Calculation

Assignments	Total points	Notes
Quizzes	420	15 points each
Homework	180	15 points each
Storytelling	150	30% for submission, 40% peer grades, 30% instructor/TA grades
Socratic seminar	250	30% for submission, 30% team grades, 40% peer grades
Final exam	300	Open book but not take home
Contest development	200	This may replace Socratic seminar
Total	**1500**	Final grades will be curved so the highest grade = 100%

Grading: ≥90%=A, 87-89% = B+, 80-86%=B, 77-79%=C+, 70-76=C, 67-69%=D+, 60-66%=D, <60%=F

Please visit http://provost.uconn.edu/syllabi-references for all course-related policies

Minimum Computer and Technical Skills

The following technical skills are needed to successfully complete this course:

- Use Microsoft Word, Excel and PowerPoint (slide-making and presenting)
- Use email with attachments
- Use HuskyCT for course materials, submission of assignments
- Copy and paste text, graphics into a word/PowerPoint document
- Open and access PDF files
- Online search of Google Scholar using key words
- Download or print online articles

Tentative class schedules

Classes on Mondays and Wednesdays are for lectures in which biotechnologies will be introduced. Meetings on Fridays will be used for student presentations either in the forms of storytelling, team Socratic Seminar debates, or contest playing. Sign-up sheets will be available for both type of presentations. Give yourself at least one to two weeks to prepare.

The schedule for each section is only tentative because new materials are yet to be developed and old ones are to be significantly modified.

Class	Date	Sections	Topics
1	08/29/22	**I. Molecular Biology**	Syllabus, Basic concepts in Genetics and Genomics Overview of biotechnology **(new)**
2	08/31/22		Biotechnology in Molecular Biology Recombinant DNA/RNA, mRNA vaccines **(new)**
3	09/02/22		**Story-telling session 1 (new)** traditional vs. modern vaccines, Polios from vaccines
4	09/05/22	**II. Micro-biology**	Biotechnology in Microbiology I **(new)** Humulin and other pharmaceuticals
5	09/07/22		Biotechnology in Microbiology II **(new)**
6	09/09/22		**Story-telling session 2 (new)** Medicines from microorganisms
7	09/12/22	**III. Genetic Engineering**	Bioengineering I: Plant GMO overview I
8	09/14/22		Bioengineering II: Plant GMO overview II
9	09/16/22		**Story-telling session 3 (new)** Examples of "other" plant GMOs
10	09/19/22		Bioengineering III: Plant GMO overview III
11	09/21/22		Bioengineering IV: Plant GMO overview IV
12	09/23/22		**Story-telling session 4 (new)** Examples of "other" plant GMOs continued
13	09/26/22		Bioengineering V in Animal Husbandry **(to be modified)** Animal Transgenesis (TG) by microinjection
14	09/28/22		Bioengineering VI: Transgenesis by somatic cell nuclear transfer (cloning)
15	09/30/22		**Story-telling session 4 (new)** Examples of GMO animals
16	10/03/22		Bioengineering VII: Gene targeting/genome-editing **(to be modified)**
17	10/05/22		Bioengineering VIII: Disease-resistant farm animals **(to be modified)**
18	10/07/22		**Story-telling session 6 (new)** Examples of GMO animals continued
19	10/10/22		Bioengineering IV: Xenotransplantation **(to be modified)**
22	10/12/22	**IV. *In vitro* fertilization**	Human *in vitro* fertilization (IVF) I: embryo development, factors affecting fertility
21	10/14/22		**Story-telling session 7 (new)** Good, bad and ugly: News-worthy IVF stories
22	10/17/22		Human *in vitro* fertilization (IVF) II: IVF industry overview **(to be modified)**

23	10/19/22		Human IVF III **Preimplantation Genetic Diagnosis (PGD)** **(to be modified)**
24	10/21/22		**Story-telling session 7** **(new)** Good, bad and ugly: News-worthy IVF stories
25	10/24/22		Human IVF IV: **Sperm and embryo sexing** **(to be modified)**
26	10/26/22		Human IVF V **(new)** Gametes, embryo and ovarian tissue cryopreservation
27	10/28/22		**Socratic seminar 1** **(new)** Are we playing God and not doing so well?
28	10/31/22	**V. Cloning**	Somatic Cell Nuclear Transfer (SCNT, Cloning) I Applications
29	11/02/22		Cloning and its applications II
30	11/04/22		**Socratic seminar 2** **(new)** How much are clones like their originals?
31	11/07/22		Cloning III: are clones born old? How are mitochondria inherited in clones? **(to be modified)**
32	11/09/22		Cloning IV: All about clones – nuclear reprogramming
33	11/11/22		**Socratic seminar 3** **(new)** Should glyphosate be banned?
34	11/14/22		Cloning V: Epigenetics SCNT: genomic imprinting, X chromosome inactivation **(to be modified)**
35	11/16/22	**VI. Stem Cells**	Stem Cell I: Embryonic Stem (ES) NCells
36	11/18/22		**Socratic seminar 4** **(new)** Stem cells
37	11/28/22		Stem Cell II: Tissue stem cells, human ES cells **(to be modified)**
38	11/30/22		Stem Cell III: induced pluripotent stem cells (iPSC) and trans-differentiation **(to be modified)**
39	12/02/22		**Socratic seminar 5** **(new)** Gene-edited babies?
40	12/05/22		Stem Cell IV: Stem cell applications in veterinary medicine
41	12/07/22	**VII. Gene Therapy**	Gene therapy I **(new)**
42	12/09/22		Gene/Cell therapy II **(new)**

2021-2022 GENERAL EDUCATION ENHANCEMENT GRANT COMPETITION

Proposer Name (s): **X. Cindy Tian, Professor of Biotechnology**

Course Proposal Title: **Everyday Biotechnology**

Email Address of *Department Fiscal Manager*: **tina.burnham@uconn.edu**

Fiscal Year 2022	**Amount Requested**	**Fringe for Summer Salary ***	**Total**
Faculty Salary (calculate a fringe rate of 25.8%)	$5962	1538.20	7500.20
Student Labor (calculate a fringe rate of 18% for Grads)	N/A		
Supplies		N/A	
Travel		N/A	
Research (Faculty Account)		N/A	
Other		N/A	
Total	$5962	$1538.20	**$7500.20**

Justification:

Please explain how the expenditure of all funds will support this proposal (100-400 words). Proposers should explain how any expenses, especially travel, will benefit the COURSE, not necessarily the professional development of the proposer.

I will spend about 4-6 weeks to develop teaching materials and assessment tools for this new course. Please see the tentative class schedule, about 70% of the class materials including assessment tools will be new to this course. My prior experience in adopting plant biotechnology to animal science students will be the model I will re-use to change technical teaching to introductory level materials for several topics. While developing new materials of various sections, I will need to read into the most up-to-date literature at the instructional level, develop class materials such as new slides at the introductory level, modify existing materials to the level of non-majors, develop teaching strategies to explain complex concepts in lay terms, search for new biotechnology products, regulations of different countries, look for new myths to debunk, learn from colleagues on how to handle large classes for group discussion/debates, find and screen introductory level supplemental reading materials, make all new quizzes, exam questions, design rubrics for discussion grading, develop topics for student discussion. The summer pay will allow me to work on these tasks. I am very excited to offer this new introductory biotechnology course to all UConn students.