New Course Proposal Form

Submitted on 02/05/2024 by Paul Durham (Pauldurham@missouristate.edu).

***All fields require input**

- (●) New COURSE
- ( ) New REGULAR PERMANENT SECTION of an existing variable content course. If a new regular section of an existing variable topics course, enter the existing course number below

Course Code: BIO

Course Number: (Check Availability) 503

Course Title: Epigenetics and Human Health

Will this course become part of a program? (●) No ( ) Yes (A corresponding program change form must be submitted)

Will this proposal need to be reviewed by CGEIP? (●) No ( ) Yes

Will this proposal need to be reviewed by EPPC? (●) No ( ) Yes

Prerequisite/Co-requisite or enter 'None': C- or better in BIO 320, BIO 355, OR BMS 321

Catalog Course Description: (Include any Pass/Not Pass grading restrictions, repeatable limits, limitation on course applicability, UG/GR parallel course, etc.)

Includes principles of epigenetic regulation of gene expression (e.g. chromatin, DNA modifications, non-coding RNA, and RNA editing). Discussion topics include regulation of these events, and molecular techniques that detect epigenetic marks. Furthermore, students will investigate recent literature to describe current understanding of relationships between epigenetic mechanisms, the environment (e.g. aging, diet, exercise, chemical exposure, malignancies), and organismal fitness. May be taught concurrently with BMS 503, BMS 603, and BIO 603. Can only receive credit for one of the following: BMS 503, BMS 603, BIO 503, or BIO 603.

637/30000 character limit.

Credit Hours: 3 Lecture Contact Hours: 3 Lab Contact Hours: 0

Note: If variable credit, enter the highest number and add to end of course description. (e.g. "Variable credit, may be taken 1-3 hours.")

Periodicity. Check all that apply.

- [ ] Fall
- [ ] Fall (even-numbered years only)
- [ ] Fall (odd-numbered years only)
- [x] Spring
- [ ] Spring (even-numbered years only)
- [ ] Spring (odd-numbered years only)
- [ ] Summer
- [ ] On Demand only

Complete Catalog Description:
BIO 503 Epigenetics and Human Health
Prerequisite: C- or better in BIO 320, BIO 355, OR BMS 321
Includes principles of epigenetic regulation of gene expression (e.g. chromatin, DNA modifications, non-coding RNA, and RNA editing). Discussion topics include regulation of these events, and molecular techniques that detect epigenetic marks. Furthermore, students will investigate recent literature to describe current understanding of relationships between epigenetic mechanisms, the environment (e.g. aging, diet, exercise, chemical exposure, malignancies), and organismal fitness. May be taught concurrently with BMS 503, BMS 603, and BIO 603. Can only receive credit for one of the following: BMS 503, BMS 603, BIO 503, or BIO 603.
Credit hours: 3 Lecture contact hours: 3 Lab contact hours: 0
Typically offered: Spring

Include sample syllabus (list topics, course goals.) Use text box OR upload only file types of DOC or DOCX.

0/30000 character limit.
Attached View Attachment

Purpose of Course

Changes came out of conversation with Biology and BMS about course overlap and minimizing barriers for student entry and success in both BIO and BMS. Dr. Paul Durham and Dr. Randi Ulbricht have overlapping yet distinct research interests and training involving epigenetics. Dr. Durham has been teaching an epigenetics course as a special topics course in Biology every other spring for several years. The course is an elective and has been successful and attended by several BMS students as well as BIO students. Drs. Durham and Ulbricht agree to collaborate, team teaching one course, as equivalent courses in BIO and

1559/30000 character limit.

Relationship to Other Departments

Course will be offered in both Biology and BMS departments, co-taught by faculty in each.

90/30000 character limit.

Is there a graduate/undergraduate parallel course to this one? ◉ No ○ Yes

Enter parallel course number

nullnull null

How do these classes differ?

0/30000 character limit.

New Course Resource Information

Anticipated Average Enrollment per section:	30	Maximum Enrollment Limit per section:	30
Anticipated Average Enrollment per semester:	12	Maximum Enrollment Limit per semester:	15
Anticipated Average Enrollment per year:	12	Maximum Enrollment Limit per year:	15
Faculty Load Assignment (equated hours):	3		

Is another course being deleted? ◉ No ○ Yes

Select course number and title being deleted.

nullnull null

What will this course require in the way of:

Additional library Holdings

The course will rely on secondary and primary published research articles. No library books are required.

106/30000 character limit.

Additional computer resources

N/A

3/30000 character limit.

Additional or remodeled facilities

N/A

3/30000 character limit.

Additional equipment or supplies

N/A

3/30000 character limit.

Additional travel funds

N/A

3/30000 character limit.

Additional faculty; general vs specialized

N/A

3/30000 character limit.

Additional faculty; regular vs per-course

N/A

3/30000 character limit.

Other additional expenses

N/A

3/30000 character limit.

If additional faculty are not required, how will faculty be made available to teach this course?

The course fits into current teaching loads of faculty.

56/30000 character limit.

List names of current faculty qualified and available to teach this course

Paul Durham and Randi Ulbricht have agreed to co-teach. The course could also be taught by Josh Smith and Anna McWoods in BMS; and Dr. Kovacs in Biology.

155/30000 character limit.

What is the anticipated source of students for this course?

The course will be an elective for BIO majors. Other health related majors and/or plant science majors may be interested in the course as an elective to support their own program.

179/30000 character limit.

If from within the department, will students be taking this course in addition to or in place of other courses?

This will be another optional elective.

40/30000 character limit.

If from outside the department, which courses in other departments would most likely be affected?)

Offering this class in BMS and BIO course codes allows interested students the option to take the course as an elective within their home program.

146/30000 character limit.

Other comments:

300-level pre-requisites will allow students in all BMS and BIO programs to access the course when they are prepared for presenting and analyzing original research, which is a significant component of the course.

213/30000 character limit.

What is the date that this new course was approved by departmental or program faculty? (MM/DD/YYYY) 2/2/2024

Current Status:

College Council Review

Proposal Progress:

02/07/2024 - Submitted by Department Head - Processed by Kyoungtae Kim

Review Comments:

No comments have been added to this proposal.

No review notes have been added.

Copy As New Proposal

Epigenetics and Human Health
BMS XXX/ BIO XXX
Syllabus and Statement of Policy

Instructors:

Dr. Paul Durham
Distinguished Professor of Biology
Provost Fellow for Research
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Dr. Randi Ulbricht
Assistant Professor of Biomedical Science
Office: KMPT 343
Phone: 836-5730
Email: RandiUlbricht@missouristate.edu

Overview:
Recent advances in the fields of genomics and bioinformatics are supporting the fact that genetic sequence alone cannot explain how the genome regulates the development and function of complex multicellular organisms both in health and disease. The crucial role of additional layers of information piled over that of the DNA sequence has taken center stage in the last few years and thus, decades of intensive studies on genetics have led to the emergence of epigenetics. Epigenetics comprises a number of mechanisms, such as covalent histone modifications, DNA methylation, non-coding RNA, and RNA editing, which induce long-lasting changes in gene expression that are not encoded in the DNA sequence itself.

Epigenetics then reflects the way in which the environment in the wide sense regulates gene expression. In fact, it is becoming increasingly clear that the well-known beneficial role of a healthy lifestyle over a number of pathologies or as a preemptive therapy is at least in part exerted through epigenetic mechanisms. Likewise, changes in chromatin structure may lie beneath some of the altered behavioral patterns usually associated with depression and addiction. The current research on epigenetics is thus providing us with a fresh outlook to interpret genetic information. Fascinating new data suggests that we are a product of our genes, but we can also influence them through our choices and experiences.

The goal of this course is to provide a comprehensive view of epigenetics as a mechanism of gene expression regulation, but also how lifestyle affects epigenetics, impacting gene function and ultimately organismal fitness. Lectures will touch on the main concepts and background regarding epigenetics, molecular techniques to detect epigenetic marks, as well as describe the epigenetic impact of nutrition, stress, addiction, exposure to chemicals and pollutants and how some of these epigenetic marks regulate brain functions such as learning and memory.

Lecture times: T and R 12:30-1:45 pm in Plaster Stadium Room 248 and via zoom

Examinations and Grades:

Exams (300 points): There will be 2 exams and a final exam that will cover material presented in the lectures and in student presentations. The exams will consist primarily of short answer questions and

you will be able to use your notes for reference. Graduate students will have an additional essay question. Each exam will be worth 100 pts. Make-up exams will be given only in extraordinary circumstances that are legitimate and documented. They will be made more challenging than regularly scheduled exams. The arrangement for the make-up exam must be made before the missed exam.

Journal club presentation (175 points): You will be required to prepare and present a PowerPoint presentation over data from a primary research paper in an area of epigenetics and then lead the discussion on that particular paper. Your presentation will be no more than 20 minutes with 15 minutes of questions/discussion. The slide preparation will be worth 50 pts and your oral presentation will also be worth 50 pts for a total of 100 pts. At least two weeks prior to your presentation, you must get approval of the topic and selected article (needs to be a primary paper, not a review article, with a publication date after January 2022). This will be worth 25 pts. Once approved, the paper will be made available on Blackboard for other students to review. One week prior to the scheduled presentation, a draft of the PowerPoint presentation must be submitted for critique (worth 25 pts). I will make suggestions and comments to ensure that the presentation meets the required guidelines and template. The final PowerPoint presentation (converted to a PDF) needs to be available to the other students at least three days before the scheduled in class presentation (worth 25 pts). Failure to meet these deadlines will result in a loss of 5 pts per day per task. Do not procrastinate! An example presentation will be covered in class and will be posted on Blackboard.

Assignments for presentations (10 pts each): For those that are not presenting, you will be required to read the paper ahead of class and prepare 2 short questions about the paper. It could be questions about the introduction, methods, results, or the discussion. I will go over some examples in class prior to the first assignment. These questions are to ensure that you are at least attempting to read and understand the papers. It will get easier as the class goes on since you can learn from others. I will use your questions during the question and answer session following the presentation. I will not use your name but will randomly ask questions. This is an important learning objective of this course – how to critically read the primary literature. If you miss a class presentation, you will be required to write a one-page summary of the research and include any concerns with background, methodology, results, or discussion.

Potential topics to cover in student presentations:
Behavioral neuroscience – cognition/memory; pain; neurodegeneration
Cancer
Neurodevelopmental disease
Human development
Cardiovascular disease
Exercise
Obesity and Diabetes
Toxins and drugs; addictions
Therapeutic approaches (protective) – pharmaceutical and non-pharmaceutical (lifestyle)
Sexual orientation
Plants and crops

NOTE: The course syllabus, lecture material, and study guides will be available on Blackboard. You will be responsible for printing a hardcopy of the lecture notes (print 2-3 slides per page in order to save your time and money) and the articles that will be discussed during class.

Attendance:

Attendance will be monitored closely since this class only meets twice each week. Since I will be offering this class via zoom you can choose to watch the live lecture. During the presentations, I will expect that all students will attend in person or via live zoom on each presentation day since this is meant to be a discussion-based activity. If attending via zoom, I will need to see your face and will have the panel open during our discussions so I can call on you if needed. **Two unexcused absences will result in a reduction of one letter grade**. Since exams will be based exclusively on material covered in the lectures, you are more likely to do well in this course if you attend/listen to lecture each week.

Graduate students:
Exams: Graduate students will have an additional essay question on each exam that will test your overall comprehension of the material.

Presentations: Graduate students will be required to lead the discussion of other student presentations. Their own presentations will need to include a comprehensive review of the latest literature that is beyond what is found in their chosen primary paper.

The following grading scale will be used for undergraduate students (BIO 597):
(I may use the "plus" grading scale in certain situations as explained in class and round up to higher grade)

Grade	Percent
A	≥ 89.5
B	≥ 79.5
C	≥ 69.5
D	≥ 59.5
F	Below 59.5

ACADEMIC HONESTY

Any student cheating on an exam, helping someone else cheat, or participating in any other form of academic dishonesty, will receive a failing grade ("F") for the course. In cases of serious violations, academic probation or suspension is possible.

UNIVERSITY POLICY STATEMENTS

COMMUNICATION EXPECTATIONS:
Please use ONLY your MSU email when sending email correspondence to me in this course. As I teach multiple courses each semester, it will help me assist you faster if you include the course name and section number in the subject line of your email. It is also helpful if you include your Bear Pass student ID number. Not including this information could delay my response to you.
If you send an email during the week (Monday – Friday), I will typically respond to your email within 24 hours. Emails sent over the weekend or during breaks/holidays will receive a response within 48 hours. If you prefer to speak to me on the phone, I can be reached Monday - Friday (except on when the university is closed) via my office phone number (836-4869). This number is linked to my email so I will be notified that you called. If you leave a message, I will return your call within 24 hours during the week. If you leave a message after 5:00 p.m. on Friday or on the weekend it will be the following Monday before I will be able to return your call.

STUDENT SUCCESS AND INCLUSIVITY:

At Missouri State University, we are committed to your success and the creation of an environment where all students are welcome. As a community of learners, we acknowledge the value in the engagement and exchange of ideas with individuals, whose backgrounds may be different from our own.
A key element to your success as a student is to actively engage in the course activities, with your peers, and me - your instructor. If you anticipate or experience academic barriers during the course, contact me right away, so we can discuss options for addressing those barriers. Missouri State University (as an institution) and I (as a human being and instructor of this course) are committed to full inclusion in education for all persons. Services and reasonable accommodations are available to persons with temporary and permanent disabilities, to students facing mental health or other personal challenges, and to students with other kinds of learning challenges. Please let me know if there are circumstances affecting your ability to participate in class. Some resources that might be of use include:

- Disability Resource Center
- Counseling Center
- Multicultural Center
- Academic Advising & Transfer Center

Technology:
The use of technology is a part of our everyday lives at the university. There is important information you should know about your own computer's capabilities, Internet access, Blackboard, and other technology tools whether you are participating in a classroom on campus or taking an online class. For information on the basic computer requirements to be successful in class, visit the Knowledge Base for Computer Requirements on the Missouri State University website.

It is strongly recommended that, in addition to your standard means of access, you have an alternative plan for acquiring course materials, should your computer fail to function, or your Internet connectivity becomes disrupted. The MSU campus library is an excellent option if it is nearby; otherwise, most public libraries offer Internet access. If you have a laptop computer, then familiarity with local "hotspots" might also serve you well. It is your responsibility to actively and proactively address technical problems, therefore, develop a plan to address technical problems before they arise. If you need assistance with Blackboard the MSU helpdesk can be reached by phone at 417-836-5891 or by emailing HelpDesk@MissouriState.edu. You can also visit the Help Desk website for a live chat option.

Blackboard:
Blackboard will be used for our course. I will use the announcements tool to post information about the course as the semester progresses. All course assessments will be submitted through Blackboard (this includes any written assignments, quizzes, tests, etc.). You will also have access to view your grades through the My Grades link so you can stay up to date on how you are doing in the course. If you are unfamiliar with how to use Blackboard, I recommend reviewing the Blackboard Basics for Students on the Computer Services Knowledge Base.

Blackboard Ally:
To help ensure you have access to your digital learning materials in formats that work for your different devices, learning needs, and preferences, Blackboard includes a tool called Ally. Next to your course files, you'll find an icon for a dropdown menu. Simply select the icon to access a list of alternative format options from which to choose. Download speed for the different formats will depend on the file size.
Depending on the type of document, you many find some or all of the options below available:

- An OCRed PDF which is used to improve the text of scanned documents
- A Tagged PDF with improved navigation, especially if you use a screen reader
- An HTML version that will be adjust text for your mobile devices
- An ePub version if you use an eReader or tablet
- An Electronic Braille version if you're a braille reader
- An audio version for listening to an MP3
- BeeLine Reader used to add a color gradient technique to enhance focus and increase reading speeds
- A Library Reference link which will direct you to the file in its respective database where a more accessible version may be found

Explore the Accessibility website to learn about ways we are working to improve accessibility at MSU.

Netiquette/Civility:
Faculty at MSU are committed to developing and actively protecting a class environment in which respect must be shown to everyone in order to facilitate and encourage the expression, testing, understanding, and creation of a variety of ideas and opinions. You may find the **Core Rules of Netiquette** helpful for information on proper conduct when interacting with others online. Rude, sarcastic, obscene, or disrespectful posts have a negative impact on everyone's learning and will not be tolerated. As your instructor, I reserve the right to remove any discussion I deem to be disrespectful or offensive. Any person engaging in disrespectful or disruptive behavior in our course will be subject to the university's misconduct policy outlined in the **Code of Student Rights and Responsibilities**.

UNIVERSITY POLICIES:
The purpose of the University Syllabus Policy Statements is to support teaching and learning on the Missouri State campus. The established policies are in place to ensure that students, faculty, and staff may pursue academic endeavors with as few obstacles as possible.

As a student at Missouri State University, you are a part of the university community therefore, you are responsible for familiarizing yourself with the University Syllabus Policy Statements. These policies cover topics such as nondiscrimination, disability accommodation, academic integrity, among many others. For program and course specific policies please refer to the individual course syllabus provided by your instructor.

CULTURAL COMPETENCE:

Cultural Competence incorporates the inherent value of Cultural Consciousness, as one of the pillars of the Public Affairs Mission at Missouri State University (MSU) and refers to awareness of the role and significance of culture in our lives. Cultural consciousness is recognizing that we all have culture and that we live in a multicultural campus, community, society, and world.

Cultural competence is the skills and dispositions necessary to more effectively and appropriately foster engagement, empathy, respect, and interaction about and across cultural differences, developing an understanding of how these differences impact access to higher education and inclusion in the broader community. These differences may include, but are not limited to, nationality, religion, ethnicity, race, gender, age, sexual orientation, gender expression, disability, and life-experience.

Cultural competence requires authentic humility, an active, intentional, and lifelong pursuit of the knowledge of self and others. Cultural competence requires a commitment to and responsibility for educating ourselves and one another and requires the willingness to do the necessary work to enact positive change for the betterment of all.

STATEMENT OF FLEXIBILITY:
Please note that the course calendar, my office hours, etc. are subject to change due to inclement weather, student needs, instructional delays, etc. I will communicate any changes that may occur through the course announcements on Blackboard.

Missing Class If You Are Sick:
While missing class is usually not advisable, it is important to stay home when sick to avoid the spread of communicable illness. If you are sick or not feeling well, please do not come to class but rather seek medical attention from your doctor or at Magers Health and Wellness Center. They can provide you a medical excuse and advise you when it is safe to return to class. Contact your instructor to let them know that you are sick and will not be in class. By working with your instructor, you will be able to keep up with readings and assignments through the Blackboard course site.

HOW TO SUCCEED IN THIS COURSE

1. Attend lecture and pay attention. All test questions are taken from lecture material. You cannot do well in the course without understanding the lecture material.

2. Don't fall behind. If you miss a lecture, be sure to get notes from a classmate and get caught up as soon as possible.

3. Ask questions. I really appreciate it when students ask questions during lecture. It helps me to know which points/topics are confusing.

4. Use my office hours. One of the things I like about teaching is the opportunity to talk with you (not just talk at you). Please feel welcome to come in and ask questions during my scheduled conference hours, or ask quick questions after class. Make an appointment with me after class if my scheduled hours don't fit your schedule. I'll be glad to see you at these times. However, please don't just "drop in" or call at other times. Professors have many responsibilities, including research, writing grant proposals and articles, writing and grading exams, working with graduate students and so on.

5. Study effectively. Everyone develops their own habits, but here are some suggestions for studying:
    - Look over the slides assigned for each lecture before class. Lecture makes more sense if you are familiar with the material.

    - Attend lecture, and take good notes- download the PowerPoint presentations before lecture and familiarize yourself with the main points discussed in class.

    - Soon after lecture, review your lecture notes. Rewriting and organizing your notes is one of the best ways to study.

    - Before each exam, review your notes and use the study guide to test your knowledge level of the material.

Tentative Lecture Schedule:

Date	Topic	Instructor
Unit 1: Principles of Epigenetics		
1/16	Introduction, Syllabus, Overview of Epigenetics, Video	Durham
1/18	Epigenetics – basic mechanisms	Ulbricht
1/23	Chromatin structure	Durham
1/25	Histone Methylation and acetylation	Ulbricht
1/30	DNA modifications	Durham
2/1	Non-coding RNA	Durham
2/6	RNA editing	Ulbricht
2/8	Techniques detecting epigenetic markers	Ulbricht
2/13	Designing experiments to detect epigenetic changes	Ulbricht
2/15	**Exam #1**	
Unit 2: Environmental Effects on Epigenetics		
2/20	Stress and Drug addiction	Durham
2/22	Neurological diseases	Ulbricht
2/27	Sleep and exercise	Durham
2/29	Environmental toxins	Ulbricht
3/5	Chronic Pain	Durham
3/7	**Exam #2 Discussion of Questions**	
Unit 3: Current literature		
3/19	Discussion about publishing and how to read a scientific paper, article and presentation examples	
3/21	Epigenetics and Poisoning of Michigan	Durham
3/26	BDNF and Alzheimer's	Ulbricht
3/28	Grad student presentation	
4/2	Grad student presentation	
4/4	Grad student presentation	
4/9	Grad student presentation	
4/11	Undergrad student presentation	
4/16	Undergrad student presentation	
4/18	Undergrad student presentation	
4/23	Undergrad student presentation	
4/25	Undergrad student presentation	
4/30	Undergrad student presentation	
5/2	Undergrad student presentation	
5/9	**Final Exam (11-1 pm)**	