

**Spring 2024**  
**BISC 425 (4 units)**  
**“Genetics Through the Scientific Literature”**  
**DRAFT v.1**

**Instructors:**

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**Meeting times:**

1:00PM - 4:00PM, Tuesdays in Room RRI 321, and by individual appointment

**Overview and Course Content:**

This is a literature-based seminar course, designed to introduce graduate students and advanced undergraduates to complex topics in genetics by close reading of primary literature. This course gives students an in-depth appreciation of genetics by reading and evaluating the classic research papers that revealed fundamental principles, while at the same time honing their critical skills by discussing strengths and weaknesses in the approaches described. The class will meet once a week with lectures by the instructor and student-lead discussions of assigned papers, and critical analysis of the methods and logic employed. Students will write a final paper that reviews and evaluates a current research paper in genetics.

The course will be taught as a literature seminar. Each student will be responsible for reading and presenting a paper to the class. All students are expected to participate vigorously in discussion. Preparation of the presentation will require significant out-of-class preparation including multiple meetings with the faculty prior to the scheduled presentation date. This presentation will include several components:

A description of the state of the field prior to the paper,

The question(s) addressed by the paper

Experimental methodology, data, and conclusions,

A critique: what are the strengths and weaknesses of the paper, what questions remain, and how would they be addressed by contemporary scientists?

The class is in two-week blocks (A and B). In the A week, the faculty review the block topic and lead discussion on classic papers in that topic. In the second week, students will take turns leading discussion on more recent papers relevant to that topic. Student papers and presentations must be approved by the faculty.

At the mid-point of the term, students are required to identify a new paper published within the previous 6 months on a current topic in genetics. Once their choice is approved by the instructors, they will write a five-page critique similar to a detailed peer review of the paper for their final grade. This will include the same categories as for the presentation. Faculty will review interim drafts as requested.

**Prerequisites:**

- Biology/Biochemistry majors, or graduate students enrolled in biological sciences
- Permission of instructor.
- Familiarity with basic genetics (BISC 325) and molecular biology (BISC320) is assumed; BISC325 preferred, but not required.

**Web Site:** Course materials and communication will be provided on Blackboard

**Course Credit:**

Presentation	40%
Critical Analysis & Discussion	20%
Final Paper	40%

**Course Policies:**

**Presentation dates are firm.** There are no makeup exams or presentations in the course, so choose wisely!

**Critical Analysis & Discussion is essential.** You must be an active participant in all discussions to get full credit, meaning you must read all assigned papers and be prepared to present and discuss any figures when called upon. Further, students are expected to bring their own questions and ideas on the given topic to the discussion. Therefore, you must attend all classes. Any absence must be accompanied by an excuse considered valid by faculty, presented in a timely fashion. In the event of more than one absence, students are expected to write a one page report on the week's discussion paper. An acceptable written excuse or documentation must be provided to the faculty. No special assignments for extra credit are permitted.

The final paper will not be returned but will be retained for one semester by the faculty.

**Disability:** Students requesting academic accommodations based on a disability are required to register with the Office of Student Accessibility Services (OSAS) each semester. A letter of verification for approved accommodations can be obtained from OASA when adequate documentation is filed. Please be sure the letter is delivered to Dr. Finkel or Dr. Forsburg as early in the semester as possible. OSAS is open Mon-Fri, 8:30-5:00. The office is in GFS 120 and their phone number is 740-0776.

It may be necessary to make adjustments to the syllabus during the semester. Check the course web site or class announcements for updates.

Any questions or concerns regarding these policies should be addressed to faculty.

<b>Week Class date</b>	<b>Block and topic (Topic Leader)</b>	<b>Scheduled papers</b>
<b>1</b> Jan 9	Welcome and introduction; Mendel (SEF & SLF)	1865. - Mendel, Gregor. Experiments in plant hybridization. <i>Verhandlungen des naturforschenden Vereines in Brünn, Bd. IV für das Jahr 1865</i> , Abhandlungen, 3-47. (English translation!)
<b>2</b> Jan 16	<b>Block 1A</b>  Mendel, variation (SEF)	1922. - Muller, H. J. Variation due to change in the individual gene. <i>The American Naturalist</i> , 56:32-50.  1910. - Castle, W. E., and Little, C. C. On a modified Mendelian ratio among yellow mice. <i>Science, N.S.</i> , 32:868-870.
<b>3</b> Jan 23	<b>Block 1B</b>	<b>Student Presentations</b>  Students
<b>4</b> Jan 30	<b>Block2A</b>  Chromosome theory of inheritance  (SLF)	1902. - Boveri, T. On Multipolar Mitosis as a Means of Analysis of the Cell Nucleus <i>Über mehrpolige Mitosen als Mittel zur Analyse des Zellkerns. Verhandlungen der physikalisch-medizinischen Gessellschaft zu Würzburg. Neu Folge</i> 35: 67-90.  1902. - Wilson, Edmund B. 1902. Mendel's principles of heredity and the maturation of the germ cells. <i>Science</i> , NS 16: 991-993.  1902. - Sutton, W. S. On the morphology of the chromosome group in <i>Brachystola magna</i> . <i>Biological Bulletin</i> , 4:24-39.
<b>5</b> Feb 6	<b>Block2B</b>	<b>Student Presentations</b>  Students
<b>6</b> Feb 13	<b>Block 3A</b> Linkage, sex	1905. - Wilson, Edmund B. The chromosomes in relation to the determination of sex in insects. <i>Science, N.S.</i> 22:500-502.

	chromosomes (SLF)	1910 Morgan, Thomas H. Sex-limited inheritance in <i>Drosophila</i> . <i>Science</i> , 32:120-122.  1913. - Sturtevant, Alfred H. The linear arrangement of six sex-linked factors in <i>Drosophila</i> , as shown by their mode of association. <i>Journal of Experimental Biology</i> , 14:43-59.  1914. Bridges, Calvin B. Direct proof through non-disjunction that the sex-linked genes of <i>Drosophila</i> are borne on the X-chromosome. <i>Science</i> , NS vol. XL:107-109.
<u>7</u> Feb 20	<b>Block 3B</b>	<b>Student Presentations</b>  Students
<u>8</u> Feb 27	<b>Block 4A</b>  Mutation, one gene- one enzyme  (SEF)	1902. - Garrod, Archibald E. The incidence of alkaptonuria: A study in chemical individuality. <i>Lancet</i> , ii:1616-1620.  1941 - Beadle, GW, and Tatum, EL. Genetic control of biochemical reactions in neurospora <i>Proc. Natl. Acad. Sci. USA</i> 27:499  1943. - Luria, S. E., and Delbrück, M. Mutations of bacteria from virus sensitivity to virus resistance. <i>Genetics</i> , 28:491-511  1927: Muller. Artificial transmutation of a gene. <i>Science</i> 46:84
<u>9</u> March 5	<b>Block 4B</b>	<b>Student Presentations</b>  Students
<b>SPRING RECESS 10-17 March</b>		
<u>10</u> March 19	<b>Block 5A</b> Epistasis (SLF)	1932. Wright, Sewall. Complementary factors for eye color in <i>Drosophila</i> . <i>The American Naturalist</i> , LXVI:282-283.  1974. L. M. Hereford and L. H. Hartwell. Sequential gene function in the initiation of <i>Saccharomyces cerevisiae</i> DNA synthesis. <i>J. Mol. Biol.</i> 84:445-461.
<u>11</u> Mar 26	<b>Block 5B</b>	<b>Student Presentations</b>  Students
<u>12</u> Apr 2	<b>Block 6A</b>  Recombination  (SEF)	1931. - Creighton, Harriet B., and McClintock, Barbara. A correlation of cytological and genetical crossing-over in <i>Zea mays</i> . <i>Proc. Natl. Acad. Sci. USA</i> , 17:492-497.  1947.- Lederberg, J. and E. L. Tatum. Gene recombination in the bacterium <i>Escherichia coli</i> . <i>J Bacteriol.</i> 1947 Jun;53(6):673-84.
<u>13</u> Apr 9	<b>Block 6B</b>	<b>Student Presentations</b>  Students
<u>14</u> Apr 16	<b>Block 7A</b>  <b>Non- Mendelian inheritance</b>	1957: Meiotic Drive as an Evolutionary Force Author(s): L. Sandler and E. Novitski: <i>The American Naturalist</i> , Vol. 91, No. 857 (Mar. - Apr., 1957), pp. 105-110  1959 Sandler L, Hiraizumi Y, Sandler I Meiotic Drive in Natural Populations of <i>Drosophila Melanogaster</i> . I. the Cytogenetic Basis of Segregation-Distortion. <i>Genetics</i> . Mar;44(2):233-50 1959

	(SLF)	1999: Cynthia Merrill et al. Truncated RanGAP Encoded by the Segregation Distorter Locus of Drosophila Science 283, 1742 (1999);
<b>15</b> Apr 23	<b>Block 7B</b>	<b>Student Presentations</b>  Students

**Learning Objectives:**

Develop the ability to think critically, analyze, synthesize, and use information to solve problems.

Understand and apply the scientific method, including forming hypotheses, designing experiments to test hypotheses, and collecting, analyzing, interpreting, and reporting data.

Develop the ability to evaluate primary scientific literature.

Understand the study of transmission genetics at both classical and molecular levels.

**Office of Student Accessibility Services:**

Please advise the faculty ASAP of any known conflicts, any OSAS provisions, or other relevant information.

**Academic Conduct:**

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Other forms of academic dishonesty are equally unacceptable (cheating on exams, changing answers before requesting regrade, etc.) We have zero tolerance for academic misconduct. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). See additional information in SCampus and university policies on scientific misconduct, [policy.usc.edu/scientific-misconduct](http://policy.usc.edu/scientific-misconduct).

**Covid Policies:**

Students are expected to comply with all aspects of USC’s COVID-19 policy. Failure to do so may result in removal from the class and referral to Student Judicial Affairs and Community Standards.

**Support Systems:**

*Student Health Counseling Services - (213) 740-7711 – 24/7 on call*

[engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*

[suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call*

[engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office of Equity, Equal Opportunity and Title IX (EEO-TIX) - (213) 740-5086*

<https://eotix.usc.edu/>

Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age,

physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

*Bias Assessment Response and Support - (213) 740-2421*

[studentaffairs.usc.edu/bias-assessment-response-support](https://studentaffairs.usc.edu/bias-assessment-response-support)

Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

*Office of Student Accessibility Services- (213) 740-0776*

<https://osas.usc.edu/>

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

*USC Support and Advocacy - (213) 821-4710*

[studentaffairs.usc.edu/ssa](https://studentaffairs.usc.edu/ssa)

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

*Diversity at USC - (213) 740-2101*

[diversity.usc.edu](https://diversity.usc.edu)

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

*USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call*

[dps.usc.edu](https://dps.usc.edu), [emergency.usc.edu](https://emergency.usc.edu)

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

*USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call*

[dps.usc.edu](https://dps.usc.edu)

Non-emergency assistance or information.