UC San Diego

# BILCD100 – Genetics

Summer I, 2022
RCLAS: Use zoom link below for every lecture
https://ucsd.zoom.us/j/92161617849
Meeting ID: 921 6161 7849
M-Th and 12:30pm-1:50pm

## Course Description

BICD100. Genetics (4 quarter units) is an introduction to the principles of heredity emphasizing diploid organisms. Topics include Mendelian inheritance and deviations from classical Mendelian ratios, pedigree analysis, gene interactions, gene mutation, linkage and gene mapping, reverse genetics, population genetics, and quantitative genetics. Prerequisites: BILD1, BILD3

## Instructor

**Instructor**: Corinne Moeller-McCoy, PhD Candidate

**Email**: cmoeller@ucsd.edu; *Please include BICD100 in the subject line*

**Course Website:** canvas.ucsd.edu
Login: UC San Diego Active Directory credentials

**Instructional Assistants (IAs)**:
Qinqqing Gong: q5gong@ucsd.edu; OH: T, 6-8PM
Katherine Nguyen: k5nguyen@ucsd.edu; OH: M/W 6-7PM
Michelle Chiew: mhchiew@ucsd.edu; OH: M/W, 9-10AM
Rachel Lee: rjl002@ucsd.edu ; OH: M, 3-5PM

**Office Hours**
My office hours are optional and will take place via zoom 2-3PM every Tuesday and Thursday. Please stick around after class on Tuesday and Thursday to go over questions related to the problem set, lectures, readings, discussion, etc. Office hours may also be made by appointment.

**IA/TA**
Section A01: Qingqing Gong
Section A02: Michelle Chiew
Section A03: Rachel Lee
Section A04: Katherine Nguyen
Section A05: Katherine Nguyen

**Inclusion Statement**
I am committed to creating a learning environment that supports diversity of thought, perspective, experience, and identities. Professional courtesy and sensitivity are

especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me early in the semester so that I may make appropriate changes to my records. It is my hope that in this course we will develop a supportive learning community that will foster rich discussions through the sharing of personal ideas, experiences, and relationships to course material. Honesty, listening for understanding, a willingness to share your ideas, and respect for self and others are basic guidelines that can help. create a positive learning environment. Your participation and feedback is important to the success of the course and I welcome your thoughts throughout the semester on how we might improve class processes that will encourage effective communication and dialogue.

## Course Expectations

| What I expect of you | What you can expect of me |
|---|---|
| **Be informed.** Read this syllabus carefully and completely so you understand the course structure and expectations. | **Enthusiasm.** To be prepared for each class and to bring my enthusiasm for teaching to each lecture, lab, and office hour meeting. |
| **Be attuned.** Keep up with readings and lab assignments, as each one builds on the previous one. | **Responsiveness.** To respond to emails within 24 hours. For those that know me already, you know that I usually respond faster than this. Emails received on weekends or while I'm traveling may take longer. |
| **Ethical.** A good attitude and maintenance of honest and ethical principles towards me, your classmates, and the execution of the course. Please read UC San Diego's Principles of Community and Conduct Code. | **Timely feedback.** To make every effort to return graded assignments within one week of the submission date and to post solutions or code as soon as is reasonably possible after the submission date. |
| **Integrity.** An honest, fair, responsible, respectful, trustworthy, and courageous effort on all academic work and collaboration. Please read UC San Diego's Policy on Integrity of Scholarship. Then, take the integrity pledge! | **Integrity.** To uphold integrity standards and create an atmosphere that fosters active learning, creativity, critical thinking, and honest collaboration. |
| **Be flexible.** This course may be affected by the remote format or unavoidable emergencies, necessitating last-minute rescheduling. | **Reasonable** accommodation and understanding for student situations that arise; however, I will not make exceptions for one person that are not available to every other person in the course. |

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# Course Learning Outcomes

Genetics is important, interesting, and fundamental for modern biology. Genes are basic units of biology and inheritance for ALL life forms. This course will introduce and explore gene discovery and related studies, and their use in analysis and manipulation of biological function. We will also explore how genes are inherited and the importance of genetic variation in populations. We will use quantitative classical and modern approaches (problem solving) to predict genetic outcomes. At the end of this course, students will be able to:

1. Summarize genetic techniques, and explain applications of the methods to real life
2. Apply knowledge of genetics concepts to analyze and explain data, make predictions, and solve problems
3. Learn to find, read, and evaluate scientific literature

# Course Materials and Tools

**Text/Readings/Other Material**

Essentials of Genetics (10th Edition) is optional. Problem set, lecture, discussion, midterm and final questions will draw largely on material presented in class.

**CANVAS: Learning Management System**

Login: UC San Diego Active Directory credentials

# Course Format

Summer Session 2022 is offered as remote instruction. You can access the campus notice here. This class will take place in a hybrid format, which means that you will engage with some elements in real-time (synchronous), and other elements at your own pace (asynchronous), within due dates. We are all learning how to adapt to this format and will be facing this challenge together. We will do our best to engage all of you as a community of scientists. Lectures, discussion and office hours will be synchronous and take place via the scheduled class time on zoom. Some lectures will be cut short so that you may complete an assignment related to lecture at your own pace (asynchronously).

It is essential that you attend real-time Lectures, Office Hours and Discussion Sections to stay connected and earn extra credit active participation points!

All problem sets, lecture questions, midterm and final are open note, open computer. Discussion time may be used to review problem set and lecture questions. Extra credit may be earned if you are an active participant during lecture.

If your score on the final is better than the midterm, it can replace your midterm grade

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# Grading Information

## Summary of Grade Criteria

| Course Component | Points | Weight |
|---|---|---|
| **LECTURE** | **430** | **43%** |
| Course Introduction | 10 | |
| Research Assignments (7 @ 30 points each) | 210 | |
| Problem Sets (5 @ 40 points each) | 200 | |
| Final Reflection | 10 | |
| **DISCUSSION SECTION** | **270** | **27%** |
| Bio-interactives (8 @ 25 points each) | 200 | |
| Altering Mendelian Ratios WS | 20 | |
| Recombination WS | 20 | |
| Pop-Quiz (3 @ 10 points each) | 30 | |
| **QUIZZES & EXAMS** | **300** | **30%** |
| Midterm | 100 | |
| Final | 200 | |
| **TOTAL** | **1000** | |

### Grading Scale

| Grading Scale | | | | | | | |
|---|---|---|---|---|---|---|---|
| A+ | 98% - 100% | B+ | 88% - <80% | C+ | 78% - < 80% | D | 60% - < 70% |
| A | 92% - < 98% | B | 82% - < 88% | C | 72% - < 78% | F | 0% - < 60% |
| A- | 90% - < 92% | B- | 80% - < 82% | C- | 70% - < 72% | *Grades will not be curved* | |

**Grading Procedure and Feedback**
This course will not be graded on a curve, it is on an absolute scale, out of 1000 points, described above. You are therefore responsible for every point you earn.

Please feel free to work on the problem sets together, review them in discussion, bring them to my office hours, and bring them to your IA/TA's office hours. Some of the problem set questions will be reviewed in discussion.

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**Attendance and Participation**
Given the current circumstances, attendance and participation is not mandatory, but is strongly encouraged. Essential material for the course will be covered during lecture and extra credit points may be earned.

**Extra Credit**
There will be an opportunity to earn extra credit during lecture. If you are an active participant and engaged in answering the practice questions, you may earn 1 extra credit point per lecture.

**Late or Missing Assignments**
Deadlines described below must be adhered to. Please contact me ASAP if deadlines cannot be met. If I do not hear from you, late or missing assignments will receive a zero.

## Course Schedule

REVIEW THIS SCHEDULE OFTEN TO ENSURE DEADLINES ARE MET.

| Week | Day | Date | Lecture | | | Section |
|---|---|---|---|---|---|---|
| | | | Lecture | | Assignment, Activities, Due Dates | Discussion |
| 1 | M 8/1 | | L1 | Introduction; Who Are We?; Genetics<br><br>Central Dogma; DNA and chromosomes<br><br>Mitosis/Meiosis | | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Tu 8/2 | | L2 | Introduction to Mendelian genetics<br><br>Phenotype; Dihybrid Cross; Probabilities | | |
| | W 8/3 | | L3 | Pedigrees<br><br>Chi Squared Test<br><br>Different Types of Dominance | Course Introduction Due<br><br>Research Assignment #1 Due | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Th 8/4 | | L4 | Modification of Mendelian ratios<br><br>Epistasis; Complementation, Pleiotropy | Bio-Interactive #1 Due<br><br>Research Assignment #2 Due | |

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|---|---|---|---|---|---|---|
| | Sun 8/7 | | | | Problem Set #1 Due<br><br>Altering Mendelian Ratios WS Due | |
| **2** | M 8/8 | | L5 | X-linked genes and sex determination; X-linked mutations<br><br>Dosage compensation | | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Tu 8/9 | | L6 | Chromosome aberrations; Imprinting; Penetrance | Research Assignment #3 Due | |
| | W 8/10 | | L7 | Maternal Effect; Chromosomal Variation | Bio-Interactive #2 Due | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Th 8/11 | | L8 | Gene mapping: recombination and linkage | Research Assignment #4 Due | |
| | Sun 8/14 | | | | Bio-Interactive #3 Due<br><br>Problem Set #2 Due | |
| **3** | M 8/15 | | L9 | 3-point mapping | Research Assignment #5 Due | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Tu 8/16 | | | **MIDTERM** | Midterm to be submitted by 11:59PM | |
| | W 8/17 | | L10 | Bacterial genetics: mutations, conjugations | | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Th 8/18 | | L11 | Bacterial and Phage Genetics, Restriction Enzymes | Bio-Interactive #4 Due<br><br>Recombination WS Due | |
| | Sun 8/21 | | | | Problem Set #3 Due | |

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| **4** | M 8/22 | | L12 | DNA Structure; DNA mutations; | | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Tu 8/23 | | L13 | Experiments on mutagenetic compounds; Discovery of genetic material | Bio-Interactive #5 Due | |
| | W 8/24 | | L14 | Quantitative traits, QTL Mapping | Research Assignment #6 Due | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Th 8/25 | | L15 | GWAS | Bio-Interactive #6 Due | |
| | Sun 8/28 | | | | Research Assignment #7 Due<br><br>Problem Set 4 Due | |
| **5** | M 8/29 | | L16 | Regulation of gene expression - prokaryotes | | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Tu 8/30 | | L17 | Cancer genetics | Bio-Interactive #7 Due | |
| | W 8/31 | | L18 | Developmental, Population and Evolutionary genetics; Modern genetics | Bio-Interactive #8 Due | A01: 9-9:50AM<br>A02: 10-10:50PM<br>A03: 11-11:50AM<br>A04: 4-4:50PM<br>A05: 5-5:50PM |
| | Th 9/1 | | | Review Session | Problem Set 5 Due | |
| | F 9/2 | | | Final Exam | Final to be submitted by 11:59PM | |

## UC San Diego Principles of Community

The University of California, San Diego is dedicated to learning, teaching, and serving society through education, research, and public service. Our international reputation for excellence is due in large part to the cooperative and entrepreneurial nature of the UC

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San Diego community. UC San Diego faculty, staff, and students are encouraged to be creative and are rewarded for individual as well as collaborative achievements.

To foster the best possible working and learning environment, UC San Diego strives to maintain a climate of fairness, cooperation, and professionalism. These principles of community are vital to the success of the University and the well being of its constituents. UC San Diego faculty, staff, and students are expected to practice these basic principles as individuals and in groups.

Click here for the complete UC San Diego Principles of Community in English and Spanish.

## Student Resources for Support and Learning

**ACADEMIC SUPPORT**

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| Geisel Library | Research tools and eReserves |
| Content Tutoring with the Teaching + Learning Commons | Drop-in and online tutoring through the Academic Achievement Hub |
| Supplemental Instruction with the Teaching + Learning Commons | Peer-assisted study sessions through the Academic Achievement Hub to improve success in historically challenging courses |
| Writing Hub Services in the Teaching + Learning Commons | Improve writing skills and connect with a peer writing mentor |
| Learning Strategies Tutoring | Address learning challenges with a metacognitive approach |
| OASIS | Intellectual and personal development support |
| Student Success Coaching Program | Peer mentor program that provides students with information, resources, and support in meeting their goals |
| Academic Integrity | Policy on Academic Integrity of Scholarship and strategies to excel with integrity |
| Technical Support | Assistance with accounts, network, and technical issues |

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**STUDENT RESOURCES**

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|---|---|
| Basic Needs | Provides access to food, housing, and financial resources |
| Counseling and Psychological Services (CAPS) | Provides services like confidential counseling and consultations for psychiatric services and mental health programming |
| Community Centers | As part of the Office of Equity, Diversity, and Inclusion the campus community centers provide programs and resources for students and contribute toward the evolution of a socially just campus |
| Counseling and Psychological Services | Individual, group, couples, and family psychotherapy services for registered undergraduate and graduate students |
| Office for Students with Disabilities | Documents students disabilities, provides accessibility resources, and reasonable accommodations |
| Triton Concern Line | Report students of concern at (858) 246-1111 |

# Additional Optional Information

**Subject to Change Policy**
The information contained in the course syllabus, other than the grade and absence policies, may be—under certain circumstances such as mutual agreement to enhance student learning—subject to change with reasonable advance notice, as deemed appropriate.

**Letter of Recommendation Policy**
If you would like a letter of recommendation, a minimum grad of a B must be earned. I also encourage you to come office hours, engage in active class participation and demonstrate qualities that may be included in a LOR. Please provide a month notice prior to LOR deadline submission.

**Technology Policy**
This is an online course, and therefore online resources are available to you for integrated questions, problem sets, the midterm and final.