Welcome to IB 150!

IB 150 is a four credit hour course that serves both as a required introductory course for biology majors, and as an excellent, comprehensive survey course for non-majors who are looking for a course to brush up on biology for GRE biology subject exams, MCAT, and similar biology graduate-entrance exams, or anyone interested in exploring the big questions of life to fulfill their Natural Science general education requirement.

As we will see, all the properties we associate with living organisms can be grouped around 2 core concepts: the ability to pass on genetic information between generations, and obtaining the energy required to drive all of life's many chemical and physical reactions.

It is these two core principles that this course is built around: In Unit 1 we will be focusing on how energy puts limits and constraints on living systems, from the structure and function of our anatomy and physiology all the way to ecosystems. In Units 2 and 3 we will be covering that other core concept: heredity and its consequences for living organisms. By the semester we will be able to apply what we learned about the forces that shape all living organisms in a holistic way to understand why organisms are built the way they are, including an overview of their evolutionary history, and comparative physiology and anatomy.

We will all learn better and have a successful semester if we work together in a lively, interactive atmosphere! We have a very diverse set of students this semester, including many bio majors and non-majors.

I am looking forward to an engaging and interactive semester with you!

-- Ben
Course Webpage

You will find links to all pre-lecture lessons and other assignments each week on the Moodle course webpage:

https://learn.illinois.edu/course/view.php?id=68385

Login with your University NetID and password. We recommend that you bookmark this page after you accessed the course page for the first time.

Textbooks and Other Required Materials

(Required) Textbook: Freeman. Biological Science. eText of 7th edition. Pearson. (Purchasing a paper copy of the text is also possible. However, make sure that you purchase a version that includes access to Pearson Mastering Biology to access practice problem sets – no graded assignments come from the textbook). See the course webpage for more information on how to register your online components to your textbook.

(Required) IB 150 Fall 2022 course manual

(Required) iClicker

(Required) A non-programmable calculator other than your smart phone for simple calculations on exams. (Scientific calculators with displays larger than 2 rows will not be permitted on exams).

Disability Accommodations

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TTY), or e-mail a message to: disability@illinois.edu
# Tentative Class Schedule

Below is a tentative class schedule, highlighting the relationship between Lectures, Discussions and Readings. We reserve the right to make changes to the class schedule. Please consult the course homepage at [learn.illinois.edu](http://learn.illinois.edu) for assignment due dates and to check for any updates to this schedule.

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Discussions</th>
<th>Readings</th>
</tr>
</thead>
</table>
| **Unit 1**  
Life and Energy  
Week 1  
Aug. 22–28  
1.1 Introduction to Organismal Biology  
1.2 Metabolic constraints on Anatomy | Science of Life  
Chapter: 1; 2:3; 42:1-42:2 |                            |
| **Week 2**  
Aug. 29 – Sep. 4  
1.3 Form and Function of Respiratory Systems  
1.4 Form and Function of Circulatory Systems | Fick’s Law  
Chapter: 42:3 |                            |
| **Week 3**  
Sep. 5–11  
1.5 Energy Trade-offs & Ecosystem Structure  
1.6 Resources Limit Population Growth | Physiology of Respiratory &  
Circulatory Systems  
Chapter: 42:5; 53:1 |                            |
| **Week 4**  
Sep. 12–18  
1.7 Community Interactions I  
1.8 Community Interaction II | Population growth  
Chapter: 49:1-2; 51:52; |                            |

| **Unit 2**  
Life and Heredity  
Week 5  
Sep. 19-25  
2.1 Molecular Basis for Heredity  
2.2 Origin of Genetic Diversity | Community interactions  
Chapter: 16 |                            |
| **Week 6**  
Sep. 26 – Oct. 2  
Monday EXAM 1 (covers Lectures 1.1-1.8)  
2.3 Mitosis | Central Dogma & Mutations  
Chapter: 16 |                            |
| **Week 7**  
Oct. 3–9  
2.4 Meiosis  
2.5 Transmission Genetics | Understanding Meiosis  
Chapter: 12.1-12.2; 13 |                            |
| **Week 8**  
Oct. 10–16  
2.6 Patterns of Inheritance  
2.7 Polygenic Inheritance: Simple Additive | Solving Genetics Problems  
Chapter: 14 |                            |
| **Week 9**  
Oct. 17–30  
2.8 Polygenic Inheritance: Epistasis  
2.9 Linkage & Linkage mapping | Practicing Complex Patterns of  
Heredity  
Chapter: 14, 23:1 |                            |

| **Unit 3**  
Evolving Life  
Week 10  
Oct. 31 – Nov. 6  
3.1 Population Genetics Null-Model:  
Hardy-Weinberg Equilibrium  
3.2 Evolutionary Mechanisms I | Testing for Linkage  
Chapter: 23 |                            |
| **Week 11**  
Nov. 7–13  
Monday EXAM 2 (covers Lectures 2.1-2.9)  
3.3 Evolutionary Mechanisms II | No Discussion  
Election Day on Tuesday: GO VOTE!! |                            |
| **Week 12**  
Nov. 14–20  
3.4 Evolutionary Mechanisms III  
3.5 Adaptive landscapes | Making Evolutionary Inferences  
Chapter: 22; 23 |                            |

| Nov. 21–27  
Thanksgiving Break |                            |                            |
| **Week 13**  
Nov. 28–26  
3.6 Macroevolution - Speciation  
3.7 Cladistics | Natural Selection case study  
Chapter: 24; 25 |                            |
| **Week 14**  
Apr. 27 – Dec 4  
3.8 Evolution of Novel Traits  
3.9 Comparative Anatomy | Great Clade Race  
Chapter: 21:1; 47:1 |                            |
| **Week 15**  
Dec 5–7  
Monday EXAM 3 (covers Lectures 3.1-3.9) | No Discussion |                            |

| Finals week  
Dec 9-16  
Optional cumulative final exam (Lectures 1.1-3.9) | Date: TBA |                            |
## Course Grade Scale.

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<thead>
<tr>
<th>Letter Grade</th>
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<td>93–99</td>
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## Course Grade Structure.

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<th>Pts/ assign</th>
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<tr>
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<td>Pre-lecture lessons (online)</td>
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<td>Attendance (iClicker scores)</td>
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<td>Weekly homework sets</td>
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<tr>
<td>Getting to Know my Classmates</td>
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<td>Discussions</td>
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<td>Participation in Research Study</td>
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<td>COURSE TOTAL</td>
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<td></td>
<td>1000</td>
<td>(+50 pts extra credit)</td>
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Getting Help

- Only contact the course e-mail if you have a personal question.
- For all other questions about course content, activities, deadlines, technical problems, etc., please check the General Q & A forum at the top of the Moodle Course Webpage to see if someone else has already asked your same question and received a response.
- If your question isn't there yet, post your question to the General Q & A forum.
- Feel free to answer peers in the General Q&A Forum if you know the answer!
- If you have a personal question, email ib150@life.illinois.edu.

Tutoring Resources

To obtain disability The Office of Minority Student Affairs' (OMSA) Academic Services Center (ASC) offers free tutoring and academic services. Matched and drop-in tutoring along with Supplemental Instruction (SI), collaborative learning/study groups, and academic skills workshops are among the services featured in the OMSA ASC. OMSA's services are designed to help students achieve in college. The level of rigor at the University of Illinois is different than in high school or community college. No matter how you performed before attending Illinois, there is always room to examine and hone your study skills. To earn more about these services, visit:

https://omsa.illinois.edu/programs/tutoring/

or stop by the OMSA ASC located at 1103 West Oregon Street, Suite E, Urbana, IL 61801.

To make the most of your tutoring and workshop session(s):

- Request a tutor at the beginning of the term. Tutoring begins in the second week of the semester.
- Come to each of your tutoring or workshop sessions prepared. Preparation includes bringing with you your textbooks, notes, and specific questions concerning the material. The more you prepare, the more you will get out of the session.
- Tutors do not serve as a substitute for your instructional faculty. They will not "lecture" or "re-teach." They will provide strategies to help you improve your approach to mastering your course content. Tutoring is not a substitute for missed classes. If you miss class, make sure you get notes from a classmate and meet with the professor and/or TAs during office hours.
Course Policies

Exam Information

There are three hour exams, each covering the preceding Unit. Exams are held in person, are closed book, closed notes, and are based on the learning objectives of the lecture and discussion activities of each respective unit.

Hour exams consist of a combination of 25 multiple choice (MC), 3 short answer or self-constructed answer questions, and 1 essay question. Practice questions for the Hour Exams will be available on the course webpage.

Exam Dates

This course’s hour exams are scheduled to be held as EVENING EXAMS held from 7-9 pm (location will be announced via course announcements) on the following dates:

   Exam 1: Monday, September 26th
   Exam 2: Monday, November 7th
   Exam 3: Monday, December 5th

Missing an exam

If you have to miss an exam, you can have 1 exam prorated (replaced by average of the other two exams), so long as you contact ib150-course@illinois.edu at least 24 hours before the exam with an acceptable, university-sanctioned excuse and documentation. (If you get sick the day of the exam, please see below). Acceptable excused absences (with proper documentation) include:

- illness (requires a doctor’s note, or a note from the Dean of students if illness lasts 3 or more days),
- a conflict with another course’s exam that is given at the exact same time as the IB 150 exam without possibility of taking a conflict exam in that course (requires documentation of enrollment in the course and a copy of that course’s syllabus with exam date information),
- a University athletic event (letter from your athletics program required 1 week PRIOR to the exam),
- job, graduate, or professional school interviews (a best effort should be made to schedule these events around exams; documentation of interview required).

Documentation for illness has to be provided no later than 48 hours after the exam (or 48 hours after the date range of illness as indicated on the doctor’s note) to qualify for a prorated exam score. Documentation for any other reason requires documentation at least 1 day prior to exam. Missing an exam and failure to provide proper documentation within this time period will result in a score of zero for the exam score that CANNOT be replaced by the Final Exam.
Final Exam & Resurrection Policy

There is no mandatory final exam in this course.

However, if you are unhappy with your hour exam scores, you can take an **optional cumulative final exam** during the official campus final exam slot for this course (Date & Time will be announced by University and the course when available). If you choose to take this optional final exam, the final exam score will automatically replace your hour exam total **IF your final exam score is higher than the hour exam total**. A lower optional final exam score than the hour exam total will not affect your course grade in any way. This optional final exam consists of 75 MC questions & 1 essay, covers all learning goals of the semester, and you have 3 hours to complete it. **The Final Exam WILL NOT replace unexcused missed hour exam scores!**

Questions and corrections to exam grades

All exams are secure exams, so you will not be allowed to view them again after you turn them in. A key to the exam will not be posted. Students who believe that the exam had a mistake or was incorrectly graded should contact ib150-course@illinois.edu **within 1 week** of exam scores being posted and your exam will be manually reviewed for scoring errors.

Course Components

Pre-Lecture Lessons

You are required to complete the online pre-lecture lessons found on the moodle course webpage under each lecture before the beginning of each lecture. You are allowed multiple attempts at the complete lessons. Your final score will be the average score of your attempts at a full pre-lecture lesson. You can rework the questions in the study versions that open after the due date for practice or exam review without credit. **If you missed a pre-lecture due to a qualifying event (see section on excused absences) you may request an extension to complete the online pre-lecture lesson once you return from your excused absence** (there are no excused drops).

Lecture Activities

We will have group activities during many of the lecture periods and attendance is mandatory. Answers to lecture activities are submitted via iClickers. iClicker scores count as your lecture participation scores. You must attend lecture and answer at least 75% of all clicker questions to earn the points associated with each lecture.

If you forgot to bring your iClicker this also counts as a zero for lecture participation. **Being caught with someone else’s iClicker results in a charge of cheating for the missing student AND for the student found operating multiple iClickers.**
Lecture and Discussion Etiquette

We are a very large class and we need your help to make the learning environment in the large lecture hall the best as it can be. So please:

1. Arrive on time. Try to arrive early if possible. If you cannot avoid arriving late, please enter quietly and find a seat on the aisle or back of the hall so you will disturb as few of your fellow students as possible.

2. Silence cell phones and pagers, and please do not text-message during lecture. Also refrain from using laptops during lecture for anything other than IB150 lecture material (i.e., no playing online games, shopping online, watching movies, TV shows, etc.). Extra sounds and lights are distracting to those around you and negatively impacts the learning environment.

3. Be considerate of the people around you. Please no talking unless you are doing so as part of a lecture activity. If you have questions please feel free to raise your hand and the instructor or TA will assist you. Sound carries very far in the lecture hall. Even conversations held at a whisper are very distracting to others in this hall.

4. Remember that the lecture is not over until you have been dismissed. Packing up during lecture is disruptive and irritating to other classmates and instructors. If you must leave early, please sit at the back of the lecture hall so you disturb as few people as possible.

Weekly Online Homework Sets

Each week has an online homework set that is due on the Friday of the same week at 11:59 pm. Links to these assignments are found on the moodle course page in each week’s module. Each of these homework sets is worth 6 points. You have 2 attempts at each question for multiple choice questions, the second scored for ¾ credit. Note that you can check for automatic feedback immediately after the due date by visiting the homework set after its due date.

TA Grading Disputes

If you think an assignment has been graded unfairly bring it to the attention of your TA within one week after assignment is returned. Disputes will not be considered after one week. If the situation is not resolved, contact the course e-mail to set up an appointment (ib150@life.illinois.edu) immediately after meeting with your TA. We will not address disputes more than two weeks after the assignment was returned.
Late Assignments, Missed Attendance, Section Change

Late Submissions of Assignments

Online assignments are typically due at 11:55 pm CDT/CST on their listed due dates, unless otherwise noted. Discussion Prep sheets are due by the beginning of your discussion session, unless otherwise noted. All assignments must be completed on time. Late submissions will NOT be graded, unless incurred due to extenuating circumstances. Proper documentation for illness, family emergency, athletic event or other legitimate reason is required in order to receive an extension for submitting pre-lectures, and online homework assignments.

Please consult the Student Code Article 1, Part 5 to check whether a particular reason for absence is eligible for late submission of work: http://studentcode.illinois.edu/article1_part5_1-501.html.

Missed Lecture and Discussion Attendance

You must attend lecture and discussion to earn the points associated participation.

If you need to miss a lecture due to a university-sanctioned emergency, please email documentation to ib150-course@illinois.edu and the pre-lecture lesson will be extended and you will receive an excused absence for your lecture participation points.

If you need to miss discussion due to a legitimate, University-sanctioned emergency (see above), we strongly encourage you to e-mail ib150-course@illinois.edu at least 3 days in advance to schedule an alternate discussion time for the affected week. If that is impossible, your discussion score will be excused as appropriate.

Section Changes, Add and Drop Information

Use the UI Enterprise System. Instructors or TAs cannot perform any registration functions for you. Students must attend the discussion sections in which they are enrolled unless they have received authorization from their TA to attend a make-up section. Make-up requests may be denied if a section is full. Apply at your College Office before the deadline if you wish to elect the Credit/No Credit option. To drop the course after the drop deadline, students must petition a Dean in their College Office.

Late Registration

Adding the course after the first day of classes does not excuse you from assignments that you have missed. If you add the course late, you need to contact your TA within 24 hours of adding the course to set up an appointment to go over what you have missed to date. Students that add late will have due dates extended one week following their add date to allow the opportunity to complete any missed assignments. Missed class periods due to a late add do not count toward the dropped participation scores for lectures and discussions outlined above, but will be prorated if brought to our attention. Please contact ib150@life.illinois.edu to have your missed participation points prorated.
Academic Integrity

All students are responsible for reading the University of Illinois Student Code. Pay particular attention to http://admin.illinois.edu/policy/code/article1_part4_1-402.html concerning plagiarism and cheating.

- Penalties for plagiarism on course assignments result in a reduced grade for the assignment and a note in your student file. Plagiarism is the copying or leaning on sources without properly citing your source. To avoid a charge of plagiarism, all submissions need to be your own synthesis of information, demonstrating your own understanding, and any sources you used to obtain information must be properly attributed at the end of your submissions.

- If you are caught with two clickers, both you and the student whose clicker you brought into class will forfeit up to ALL iclicker points for the semester. Additionally, both will be charged with cheating and impersonation, and both will receive a note of this academic violation in the student record.

- Copying or leaning on unauthorized student files or keys obtained from other students (downloaded from the web or sharing of physical copies) will be charged as cheating and the use of unauthorized materials rather than a charge of plagiarism, and results in a score of zero on the assignment, and will receive a note of this academic violation in your student record.

- Uploading or sharing of physical answer sets or keys to assignments with other students will be charged as facilitation of cheating with a note in the student file, and a reduction in course grade by one letter grade. An additional lawsuit for copyright infringement may be filed in court if applicable.

- Any form of cheating on hour exams will result in an automatic score of zero on the hour exam and a note in the student file, regardless of the extent to which a student cheated on the exam.

- Cheating on the final exam will result in an automatic score of zero for the course and a note in your student file.

If you have been found guilty of any academic violation, you forfeit the resurrection policy.

Additional penalties may be imposed by the university, including dismissal from the university, depending on the presence of aggravating factors or if this was not your first infraction.

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Unit 1 Learning Goals & Outcomes

1. Understand how to use a manipulative experiment to answer questions with the scientific method.
   A. Define and be able to write a hypothesis as a statement that reflects a potential explanation for the research question.
   B. Use deductive logic to derive unique, testable predictions to a hypothesis.
   C. Differentiate between independent and dependent variables, and use them appropriately to set up predictions of concrete results you would expect, if the hypothesis is correct.
   D. Graph qualitatively the predicted data, identifying which treatments are expected to differ significantly (more than expected due to chance alone).
   E. Set-up an appropriate experiment that controls for the independent variable and minimizes the effect of other environmental variables, and includes a control treatment and replication in its design.
   F. Identify the role and utility of control treatments, replication of treatments, and sample size in any experiment.

2. What does it mean to be alive?
   A. List five characteristics all organisms on Earth share.
   B. Explain why all but evolution require input of energy.
   C. Understand how the ability to perform work is related to being alive.
   D. Predict the direction of net flow of water across a cell membrane due to osmosis given information about solute concentrations on either side of the membrane. Explain what happens to rates of movement of water molecules in both directions across the membrane at equilibrium.
   E. Understand that net flow of molecules due to osmosis is a result of the rates of movement of particles in both directions, NOT as a result of an inherent preference or force moving these molecules in one direction or the other.

3. Be able to apply the First and Second Law of Thermodynamics and explain their relevance to living processes
   A. Define the First and Second Law of Thermodynamics.
   B. Use the First Law of Thermodynamics to explain how chemical reactions transfer energy from one molecule to another.
   C. Understand how molecules store chemical potential energy.
   D. Determine whether a change of a system increases or decreases in enthalpy (ΔH) and entropy (ΔS) over the course of the reaction.
   E. Use the Second Law of Thermodynamics to predict whether a process is exergonic or endergonic and thus will proceed spontaneously or not by qualitatively applying the equation ΔG = ΔH – T*ΔS.
   F. Define exergonic and endergonic chemical reactions.
   G. Explain why four of life's characteristics are endergonic processes.
   H. Understand that energy to sustain life is derived from chemical potential energy.
   I. Be able to identify the most common sources of chemical potential energy.
   J. Understand the role of cellular respiration in the transfer of energy from glucose to work done in the cell.

4. How do organisms control reaction rates?
   A. Be able to draw a graph that illustrates activation energy in a graph of the time course of a chemical reaction
   B. Explain why raising temperature helps overcome the activation energy of a chemical reaction.
   C. Explain how adding catalysts helps overcome the activation energy of a chemical reactions
   D. Be able to use these terms in context: catalyst, enzyme, active site
   E. Understand why the majority of chemical reactions an organism relies on are catalyzed with enzymes.
5. Explain how organisms manage to run endergonic reactions without violating the Second Law of Thermodynamics.
   A. Explain why four of life’s characteristics are endergonic processes.
   B. Understand that energy to sustain life is derived from chemical potential energy.
   C. Be able to identify the most common sources of chemical potential energy.
   D. Explain how organisms can drive endergonic reactions via energetically coupled reactions.
   E. Know the overall ΔG of energetically-coupled reactions. Understand what happens to the energy represented by ΔG of the overall, coupled reactions.
   F. Use the concepts of energetically-coupled reactions to explain how ATP does work in the cell via substrate-level phosphorylation, and classify the sub-reactions during phosphorylation as either endergonic or exergonic.

6. Energetic constraints on the cell/body size and shape
   A. Define diffusion versus osmosis
   B. Predict (in a general sense) changes in the rate of diffusion given changes in the various parameters of Fick’s Law of Diffusion
   C. Justify why the net movement of a group of molecules along a concentration gradient due to diffusion can be caused by the random movement of individual molecules
   D. When provided with equations for the surface area and volume of a shape, use them to explain why the SA:V of a small shape is greater than that of the same shape at a larger size.

7. How do physical and physiological limitations determine the anatomy of respiratory systems?
   A. Illustrate the path of a molecule of O₂ from the atmosphere to a cell within the body of a mammal and (separately) a fish, and an organism that does not possess a circulatory system (such as a plant).
   B. Identify and contrast the features of the respiratory and circulatory systems of insects and mammals that allow mammals, but not insects, to attain large body sizes.
   C. Identify variables of Fick’s Law in anatomical structures.
   D. Use surface area:volume ratio to explain the relationship between respiratory surface area and the body size and respiratory anatomy of animals.
   E. Explain how counter-current flow increases the ability to absorb oxygen from the environment
   F. Justify alternative hypotheses for why not all organisms possess seemingly “optimal” solutions.

8. How does the mammalian circulatory system function?
   A. Conceptually illustrate the relationship between the respiratory and circulatory system in vertebrates.
   B. Know the general flow of blood through the mammalian circulatory system.
   C. Know the major layout and function of the mammalian heart.
   D. Explain two reasons for changes in blood pressure in arteries vs. capillary beds vs. veins and know anatomical differences between arteries and veins to account for these differences in blood pressure and ability to move blood under these differing conditions.
   E. Be able to use the following terms in context: pulmonary and systemic circuit, arteries, arterioles, veins, capillaries, vena cava, pulmonary artery, aorta, left and right atrium, left and right ventricle, septum

9. What are trade-offs associated with different metabolic strategies?
   A. Be able to define and distinguish endothermy and ectothermy, and homeothermy and poikilothermy.
   B. Identify how each of these strategies regulates its body temperature.
   C. Describe the trade-offs that are associated with each of these metabolic strategies.
   D. Identify trade-offs associated with different metabolic strategies and trophic efficiency and be able to explain why an organism cannot be simultaneously be good at everything.
10. How does energy flow structure ecosystems?
   A. Define Tansley's ecosystem concept.
   B. Identify and group organisms by trophic level.
   C. Draw a diagram that illustrates ecosystem processes in terms of pools and fluxes of energy.
   D. Summarize and apply the 10% rule of trophic efficiency and be able to explain why the trophic efficiency can NEVER be 100% (and is usually much, much lower than that).
   E. Draw connections between the 10% rule of trophic efficiency and the Second Law of Thermodynamics to illustrate why trophic inefficiency provides an unavoidable constraint on communities.
   F. Identify energy losses that contribute to trophic inefficiency, and be able to identify some of the factors that can contribute to variation in ecological efficiency between different organisms.

11. How do resources limit population growth?
   A. List the four factors that determine population size and growth rate.
   B. Define the terms $b$, $d$, $r$ and $K$ and relate them to change in population size ($N$).
   C. Compare and contrast density-dependent and density-independent limits on population growth and provide examples of each.
   D. Use the mathematical models of exponential population growth $dN/dt = rN$ to calculate and graph population size for the next generation.
   E. Qualitatively apply the mathematical model of logistic population growth $dN/dt = rN * (K-N)/K$ to be able to predict the direction of change to population size given information about $N$, $r$, and $K$.
   F. Explain what condition(s) have to be met for a population to be able to overshoot $K$.
   H. Predict conditions under which either $r$- or $K$-selected strategies may be favored.
   I. Relate environmental degradation to changes in $K$.

12. How do species interact with their environment?
   A. Differentiate between biotic and abiotic components of an organism's environment.
   B. Define an ecological niche of an organism as optima and range of tolerance for all environmental components (biotic and abiotic) important to an organism.
   C. Define and contrast populations and communities
   D. Define the four general classes of biotic interactions (competition, predation/parasitism, mutualism, and commensalism), be able to characterize each using (+/-) terminology, and be able to give examples of each.
   E. Differentiate intraspecific competition from interspecific competition
   F. Explain why two species competing over the same resources in the same way (competing for the same niche) will always result in competitive exclusion of one of the two species.
   G. Use the concepts of competition to differentiate fundamental niche and realized niche and predict the outcome of the interaction in a competition experiment if information on resource efficiency per individual of both species is provided.
   H. Use the concepts of predation to explain and predict changes population size in predators and prey through time.
   I. Explain in part how environmental heterogeneity, resource availability, and more complex food webs can result in sustaining species diversity in the face of competition for resources and predation.
   J. **Be able to use the following terms in context:** optimum, range of tolerance, fundamental niche, realized niche, predation, competition, mutualism, commensalism, exploitative competition, interference competition, competitive exclusion.
Unit 2 Learning Goals & Outcomes

13. What is the structure and function of DNA?
   A. Distinguish between genotype and phenotype
   B. Know the structure and function of DNA
   C. Know the base-pairing rules and be able to apply them to create complementary DNA strands during DNA replication.
   D. Understand how base-pairing rules lead to a semi-conservative model of DNA replication.
   E. Describe the Central Dogma of Biology.
   F. Differentiate RNA from DNA.
   G. Be able to transcribe and translate a gene sequence to the protein product, if given an mRNA codon chart.
   H. Be able to use the following terms in context: base-pairing rules, sugar-phosphate backbone, nucleotide, nitrogenous base, hydrogen-bonding of nitrogenous bases, DNA, gene, allele, chromosome, chromatid, locus. mRNA, tRNA, rRNA, gene product, polypeptide, protein, amino acid, ribosome, codon, start and stop codon, redundancy and unambiguity of genetic code.

14. What is the origin of genetic variation?
   A. Define a mutation, and relate it to alleles and genetic diversity in a population.
   B. Illustrate how mutations occur at the DNA level.
   C. Identify any mutation both by cause and by effect.
   D. Distinguish the effects on the protein product of a missense mutation, a silent mutation, a nonsense mutation, and a single-nucleotide frameshift mutation, and predict the severity of the mutation for the resulting protein's function.
   E. Identify and define the property of the triplet genetic code that permits a genetic mutation to have no effect on the resulting protein product.
   F. Identify two natural mechanisms that help prevent mutations from occurring.
   G. Be able to use the following terms in context: substitution, indel, silent, missense, frameshift, nonsense mutations

15. Understand the organization of genomes
   A. Understand how our genome organized in a karyotype, and be able to label gene loci appropriately on chromosomes.
   B. Differentiate autosomal chromosomes (autosomes) from sex chromosomes.
   C. Draw the same chromosome in the replicated and unreplicated state, explain why both structures represent a single chromosome, and then label the sister chromatids in the replicated chromosome.
   D. Draw and identify a cell of an organism of any ploidy (haploid, diploid, tetraploid, etc) and chromosome number and designate it with karyotype formula.
   E. Understand how genes and alleles are distributed among homologs and sister chromatids in a karyotype.

16. Mitosis: How do organisms pass on genetic information during asexual reproduction?
   A. Describe the cell cycle, and be able to draw diagrams that show how chromosomes move and are divided between daughter cells during mitosis.
   B. Explain when mutations can occur during the cell cycle.
   C. Explain the significance of the events that occur during Mitosis, and why these events result in the production of two genetically identical daughter cells.
   D. Be able to use the following terms in context: Karyotype, chromosomes, autosomes, sex chromosomes, chromatids, ploidy, diploid, haploid, homologous chromosomes, G1 phase, S phase, G2 phase, M phase, centrosome, centromere, spindle fibers, cytokinesis

17. How does Meiosis result in the production of genetically distinct, haploid gametes?
   A. Compare and contrast "bacterial sex" to "true" sex
   B. Depict the life cycle of animals, fungi and plants
   C. Diagram the major events in meiosis for a diploid organism, relating each part of meiosis with the ploidy of the cell.
D. Describe the process of gametogenesis: Differentiate the process for males and females, and explain how oogenesis can result in very large egg cells.

E. Use a diagram of chromosome dynamics during meiosis to trace on a diagram maternal and paternal alleles into gametes.

F. Describe the fundamental similarities and differences between mitosis and meiosis.

G. Diagram how the process of Independent Assortment results in genetic diversity of gametes by shuffling alleles of two or more genes located on different chromosome types.

H. Predict how many genetically unique gametes can be produced via Independent Assortment alone, given information on chromosome number.

I. Diagram how the process of crossing-over results in genetic diversity of gametes by shuffling alleles of two or more genes located on the same chromosome type.

J. Relate recombination of alleles of linked genes to crossing-over during meiosis.

K. Use the concepts of Independent Assortment and crossing-over to explain how it is possible for the offspring of a single, self-fertilizing parent to have different combinations of alleles that are not present in that parent.

L. Compare/Contrast asexual and sexual reproduction, and the opportunities for genetic diversity afforded by each.

M. Be able to use the following terms in context: plasmid, gamete, gametophyte, sporophyte, diploid versus haploid-dominated life cycle and alternation of generations, ploidy, chromosome, chromatid (sister and non-sister), homologs, and gametes

18. Understand how sexual reproduction (i.e. the combination of meiosis and fertilization) results in a large genotypic and phenotypic diversity

A. Define and relate ploidy, alleles and dominance

B. Differentiate expected proportions of gametes/offspring from observed proportions of gametes/offspring

C. Relate genotype to phenotype, given information on which alleles are dominant and recessive

D. Define the term "carrier" with respect to a genetically determined trait

E. Identify on a pedigree: males, females, mating couples, parents and offspring, genotypes and phenotypes (where indicated)

F. For a given trait, use information on sex and phenotypes of relatives to predict their genotypes (for example using a pedigree)

G. For a given trait, use information on sex and phenotype to predict the mode of inheritance of that trait (e.g., autosomal recessive) (e.g. using a pedigree)

H. Predict genotypes of all possible gametes produced by an individual, following any given number of genes.

I. Understand how the Punnett Square is used as a probability table of combining every combination of possible events.

J. Determine the potential offspring of two parents of known genotype for mono- and dihybrid crosses, showing the potential gametes of each parent, and all potential combinations thereof, organized in the form of a Punnett square.

K. Apply the "and" and the "or" rule to calculate the probability of a future event (or events).

L. Calculate the probabilities of the genotypes and phenotypes of offspring from well-defined crosses.

M. Justify (explain in your own words) why any particular cross between parents of known genotypes results in a particular ratio of potential offspring genotypes and phenotypes.

N. Use genotypic (or phenotypic) ratios of offspring to predict the genotypes of parents.
19. More complex patterns of inheritance

A. Use a test-cross to determine parental genotypes, and explain why a test cross is uniquely suited for this task (compared to other possible crosses).
B. Solve and explain genetic patterns resulting from genes that lie on the sex chromosomes and be able to recognize sex-linked traits (both X- and Y-linked traits) in pedigrees.
C. Use the concept of probability to explain why X-linked traits are more common in males than females (in those organisms with a XY sex determination system).
D. Explain how independent assortment relates to production of gamete and genotypic frequencies in crosses involving more than one gene (specifically, what assorts, and when during meiosis do they happen?)
E. Predict all possible gamete genotypes produced by an individual when following more than one gene (e.g. dihybrid or trihybrid crosses).
F. Predict phenotypes resulting from polygenic traits that result in quantitative phenotypic trait distributions (simple additive polygenic inheritance).
G. Predict phenotypes of crosses involving two or more epistatically interacting genes.
H. Be able to use the following terms in context: homologous genes, Sex-linkage, X-linkage, hemizygous, polygenic traits, epistasis, model organism

20. How can you test for linkage and create linkage maps?

A. Articulate the utility of model organisms for understanding basic biological principles, including understanding aspects of human biology.
B. For gametes produced by heterozygous and homozygous parents, trace on a diagram maternal and paternal alleles into gametes.
C. Explain why linkage between two genes on a single chromosome does not allow the two genes to assort independently.
D. Predict parental and recombinant type frequencies, assuming two genes are independently assorting.
E. Understand how to set up test crosses to test for independent assortment (what genotype of parents do you need, how to interpret the results, how to use a Chi-Square test to evaluate your hypotheses).
F. Explain why parental and recombinant frequencies differ from predicted frequencies of independently assorting genes for linked genes.
G. Differentiate sex-linkage from linkage.
H. Understand how genetic crosses can be used as experiments to test hypotheses related to inheritance of traits.
I. Understand why we need statistical tests to differentiate differences between observed and expected results that occur because of an underlying mechanism responsible for these differences versus differences between observed and expected results due to chance alone.
J. Understand what the p-value in a statistical test indicates.
K. Apply the Chi-Square statistic to test whether observed parental and recombinant frequencies deviate from expected frequencies of independently assorting genes more than would be expected due to chance alone (with p<0.05).
L. Interpret results from the Chi-Square test that indicate deviations of observed from predicted recombinant and parental type frequencies in test-crosses with dihybrid individuals.
M. Predict the relative chances of a crossing over event when given the location on a single chromosome of two genes with respect to a third.
N. Construct linkage maps of linked genes using recombinant frequencies in centiMorgan (cM)
Unit 3 Learning Goals & Outcomes

21. What is biological evolution?
   A. Differentiate between different sources of diversity among individuals in a population, including heritable variation and environmentally-induced variation due to phenotypic plasticity.
   B. Identify variation that is of evolutionary significance
   C. Define biological evolution with respect to allele frequencies

22. Understand the intimate relationship between populations and genetic diversity
   A. Calculate allele frequencies given genotype frequencies or number of individuals with each genotype
   B. Explain (in your own words) the predictions of the Hardy-Weinberg (HW) Principle.
   C. List and restate (in your own words) the five assumptions/conditions of the Hardy-Weinberg principle, and know under which conditions it is OK to make these assumptions, or why you are testing for violations of these assumptions.
   D. Predict allele and genotype frequencies of rare genetic disorders in a population from phenotypic data alone, ASSUMING that the population is in Hardy-Weinberg Equilibrium, and understand the limitations of your estimates.
   E. Calculate the expected frequencies of offspring of particular genotypes or phenotypes expected in the next generation if the population is in Hardy–Weinberg equilibrium given allele or genotype frequencies in the current generation
   F. Be able to apply the Hardy–Weinberg equation to estimate the frequencies of carriers in a population, assuming alleles of the gene in question is in Hardy–Weinberg Equilibrium
   G. Understand in what sense the Hardy-Weinberg equation represents the prediction of the null hypothesis of biological evolution.
   H. Determine whether or not a population is in Hardy-Weinberg equilibrium using the Chi-Square statistic to compare expected and observed genotype frequencies of a population, and explain the biological implications of either rejecting or failing to reject the null hypothesis based on your results.

23. What causes genotype frequencies not to be in HW equilibrium in a population?
   A. List the four processes that change allele frequencies and the five that change genotype frequencies in populations through time.
   B. Restate (in your own words) what it means for an allele to be fixed in a population or lost from a population.
   C. Relate allele fixation to genetic diversity (e.g., what is the effect of fixation on genetic diversity?).
   D. Identify processes that can cause alleles to be fixed or lost and re-introduced.
   E. Describe the concept of “random sampling of alleles” in genetic drift making specific reference to the parental gene pool and offspring genotypes.
   F. Understand how genetic drift can cause alleles to become more or less common or fixed in populations
   G. Predict the relative effects of genetic drift in large vs. small populations and predict the relative time to allele fixation for large vs. small populations undergoing drift.
H. Compare and contrast the causes and consequences of the “founder effect” and population bottlenecks.
I. Define gene flow and relate it to migration between populations
J. Explain how gene flow influences effective population size, allele frequencies, and genetic divergence between populations living in different regions.
K. Understand how non-random mating can influence genotype frequencies, and be able to illustrate graphically why non-random mating alone will not change allele frequencies
L. Predict how inbreeding will change genotype frequencies, and be able to graphically illustrate why non-random mating will not by itself change allele frequencies.
M. Justify why inbreeding does not cause evolution directly, yet can speed the rate of evolutionary change.
N. Justify why ALL natural populations will evolve, making reference to assumptions made under the Hardy-Weinberg Principle.

24. How do biotic and abiotic interactions lead to adaptations?
A. List the four postulates of natural selection
B. Discuss the consequences of differential survival and reproduction for variation in a population. (Why is “Survival of the fittest” not capturing the whole story?)
C. Compare and relate the roles of reproduction and survival in natural selection.
D. Identify sexual selection as a sub-category of natural selection that increases reproductive success through mate acquisition.
E. Define fitness in the context of natural selection.
F. Identify that evolution by natural selection results directly from intraspecific competition between individuals of different genotypes.
G. Explain why natural selection does not result in evolution of a trait because a population “needed it”, but can only operate on pre-existing variation in the population.
H. Defend the statement that selection is reactive, and not a directed process with foresight.
I. Justify why traits/behaviors for the “good of the species” (but at the cost of an individual’s fitness) would not be favored by natural selection.

25. How does natural selection cause non-random changes in allele frequencies in a population?
A. Predict how biotic and abiotic selection pressures result in changes of allele frequencies in a genetically diverse population.
B. Justify why mutation is a random process to introduce alleles, but evolution by natural selection is a nonrandom process that can alter allele frequencies in a population.
C. Compare and contrast expected changes in allele frequency in a population depending on if that allele is under selection vs. experiencing drift.
D. Compare and contrast different modes of natural selection and relate them to differences in fitness of phenotypes and resulting changes in allele frequencies: (Directional, Stabilizing, Disruptive Selection)
E. Explain multiple ways in which a deleterious allele can persist in a population.
26. How do new species arise?
   A. Define a biological species
   B. Define reproductive isolation and relate it to gene flow among populations
   C. Explain why gene flow makes speciation by reproductive isolation less likely
   D. Compare and contrast forms of pre-zygotic and post-zygotic reproductive isolation and be able to give examples of each.
   E. Contrast allopatric and sympatric speciation.
   F. Define the concept of “divergence” with respect to two recently isolated populations
   G. Be able to identify how genetic drift and different modes of natural selection can enhance divergence between recently isolated populations.
   H. Identify why disruptive selection is a conducive mechanism to result in sympatric speciation.
   I. Explain how secondary traits (such as sexually selected traits) that lead to increased reproductive isolation can increase fitness of individuals among sympatrically diverging populations.

27. How can we infer evolutionary relatedness using cladistics?
   A. Define nodes and branches
   B. Explain how we can use traits/characters to group related organisms
   C. Define a clade and know that clades are nested groupings of organisms, clade within clade, that group organisms by ever more distant common ancestors.
   D. Compare and contrast shared derived traits and shared ancestral traits, and know which is used to define a clade
   E. Understand that any character that is a shared derived character for one clade, can be a shared ancestral character for another clade.
   F. Contrast Monophyletic, Paraphyletic, Polyphyletic groupings
   G. Be able to use a set of characters for different species to create a cladogram, using the principle of maximum parsimony.
   H. Contrast homologous versus analogous characters, be able to give examples.
   I. Be able to identify a character as homologous versus analogous when presented with a cladogram of a lineage that displays these characters.
   J. Explain how convergent evolution can result in analogous traits
   K. Understand how DNA sequences can be used as characters in cladistic analysis.
   L. Explain the basic assumptions made in cladistic analyses, what errors can occur, what causes these errors in inferring evolutionary relationships to occur, and how to guard against errors in constructing phylogenies/cladograms.

28. Ultimate anatomical explanations: How did the vertebrate heart evolve?
   A. Contrast proximate versus ultimate explanations.
   B. Highlight the main evolutionary changes associated with the origin of tetrapods, and tetrapod limbs in particular.
   C. Define “pre-adaptations”.
   D. Contrast the selective pressures that tetrapod limbs originally evolved under, with what they were later co-opted for in terrestrial tetrapod lineages.
   E. Explain why we essentially never see the appearance of a brand-new structure “from scratch”, but rather tinkering with pre-existing structures that can be co-opted for new functions.
   F. Reconstruct basic developmental organization of a common ancestor, given information about shared regulatory genes among members of descendant species.
29. Ultimate anatomical explanations: How did the vertebrate heart evolve?

A. Compare and contrast the general outline of the mammalian/avian circulatory system with that in fish, lungfish, and amphibians.

B. Be able to generate hypotheses regarding the evolutionary origin of anatomical structures given information on the phylogenetic relationships between lineages.

C. Be able to use the following terms in context: derived structures, analogous structures, shared ancestral structures, phylogenetic constraint
Tips for Success

Course Structure & Philosophy
This course is designed to train you how to think like and ultimately become a biologist, and not merely as a survey course about biological topics.

What this means is that this course will not value memorized factoids, as fascinating as they may be, but instead aims to provide you with some of the core tools that an organismal biologist can use to apply in novel contexts, test new hypotheses, and arrive at reasonable and testable predictions on the quest to learn new aspects of how living systems work.

This does not mean that factual knowledge is unimportant – you will need to learn the nuts and bolts of the concepts covered. But it is not enough. You will need to gain a deeper understanding of the causal and mechanistic nature of processes that allow you to extrapolate or deduce implications in novel contexts.

Most students have taken HS and other intro courses that focused at the cognitive level of “memorizing” and “understanding”, collectively called “Lower Order Cognitive Skills”. Professional schools like med schools, grad schools, and employers alike mostly value “Higher Order Cognitive Skills”. Proficiency in these requires multiple years of dedicated training. In this course we will repeatedly push ourselves to the application, and occasionally to the analyzing level to start on this journey.

In summary: Learning should push you into the unknown and give you the power to evaluate the rigor of a logical argument or interpretation of results in the context of our previous understanding of a concept. In this course, and hopefully throughout your college career, always push yourself to whether you understand “why” and “how” something works, to where you are confident you could apply it to solve problems in a new setting using the covered concepts.
How to use the provided learning goals and targets:

This course is organized around explicit learning goals and targets that are provided to make the course’s expectations explicit for you and avoid surprises on the hour exams. Each unit in this course is accompanied by a set of learning goals and targets that should be your learning guide as you study.

Be careful not to confuse the role of targets and goals when studying!

The goals are the bold, numbered, broad questions. It is this goal that you want to focus on fully understanding and gain the ability to apply its implications in novel scenarios.

The targets are a set of components that you need to be able to apply synthetically in your full explanation of the goal.

In other words, fully understanding, explaining and applying the goals to gain new insights is what you want to reach. The targets are steps or components that help you get there.

One effective way to use the goals and targets is to take a goal you are studying and see if you can write an essay in 1 or 2 paragraphs to fully explain how it works. Then you can use the targets to “grade” yourself whether you were able to draw on all the relevant aspects in your essay to explain this goal.

→ Memorizing terms, steps, or answers to individual targets will not be enough to succeed on exams in this course!
How to Structure My Learning

To be successful in IB 150 you will need to do more than come to class and cram for exams. We have compiled the following tips to help you be successful in IB 150 and the other science classes you will be taking.

What to do before class:

1. Read or at least skim the assigned reading before doing the lectures. You will have an easier time keeping up with lecture and learning the information if you have read over the information before attending class. This will also help you prepare for in-class quizzes.

What to do in class:

1. Come prepared to learn. It is very easy to get distracted in an online learning format. Minimize electronic distractions. Research has shown that people don’t learn as well when they are trying to multitask. This may mean turning your phone off so you can focus on the lecture.

2. Take notes
   a. While many students prefer to take notes on their computers, it is easy to get in the habit of trying to record everything the instructor is saying without actually understanding the material. Recent research suggests that taking notes by hand is a better option for many students and leads to higher learning gains.
   b. For taking notes by hand - one useful technique is the use of right page/left page notes. In class, use the right page to record your class notes. After class, use the left page to organize your notes (make tables, concept maps) and add additional supporting material (from pre-lecture videos, textbook, or discussion).
   c. When taking notes, try not to stop the video every 5 seconds to copy everything down that was said. Doing so requires minimal processing of information. Instead, watch the full 3-5 minute chunk, and then try to summarize the main points in your own words. If you forgot something, you can always rewind and watch it again.

3. Ask for clarification if you don’t understand something. You can do so in the weekly Content Q&A forum for extra credit, and bring your questions to office hours!

4. Actively engage in learning activities with your group. One of the best ways to learn material is by explaining it to someone else.
Study Tips

What to do after class:

1. Review your notes - do this as soon as you can after class. Rewriting your notes in your own words can be a very helpful way to learn. A useful approach is to see if you can rewrite your notes to now be able to explain the associated Learning Goals. Try to write a mini lesson that explains the entire bold goal, by drawing on each of the targets as part of your full explanation.

2. Take this opportunity to create graphical organizers such as Venn diagrams, tables, and concept maps. These organizers will help you see how the content goes together in each class.

3. If after reviewing your notes you have questions - get help (go see a TA or Dr. Clegg in office hours). The content in science classes builds on previous classes - don’t wait until the exam.

General Study tips:

You will not learn the material covered in IB 150 by cramming the night before an exam. Here are some tips that will help you be successful on exams:

1. Review the material (class and discussion) frequently.

2. Build concept maps using key terms - make sure you understand the relationships between these terms. Simply making flashcards and memorizing definitions will not lead to success.

3. Create exam questions from class and discussion material and then try to answer them. Try to make questions that require application of knowledge not just memorization of facts.

4. Make drawings from your notes. Making a diagram or flowchart from your notes can help you understand how concepts are related.

5. Study in blocks - don’t study for hours on end. Study some biology and then take a break or study something else.

6. Make sure that you get some sleep after studying - you need to sleep for your brain to process any new information.

7. If you have exam anxiety, research has shown that journaling can improve student exam success. Before the exam, take 10 minutes to write down what is making you anxious about the exam (or other things that may be going on). This will free up your brain and break the cycle of thinking about your anxieties more than about what you have achieved. These studies have shown that exam performance increases by half a grade to a grade simply by writing down what is on your mind to free the mind to tackle the exam questions.
What to do during my weekly study time:

Check out specific study strategies and problem sets in the “Additional Study Materials” section of this course manual for specific tips of how to use the course materials during your studying, and for additional practice problem sets.

For exams:

1. Be able to explain all learning goals to someone so they understand WHY and HOW the concepts covered work.
2. Redo the lecture and discussion activities. Pay attention to which learning goals and concepts we practiced applying and the logic needed to apply them to make predictions in each activity. You will need the same line of reasoning to solve problems that draw on these concepts on the exam!
3. Use study versions of the homework assignments and the practice exam to practice the following problem-solving strategy and use it on the exam for applied problems:
   a) **Identify the concept** you need (e.g.: counter-current flow, Fick’s Law, trophic cascade, etc)
   b) **Make a quick sketch or summary** IN WRITING in the margins of your exam to remind yourself how this concept works, and the logic we practiced in class for how to use it.
   c) Return to the problem and **identify what is different and similar** in this problem from problems we did in class, then **apply the same logic we practiced** to predict what will happen under the changed circumstances.

Strategy for solving applied questions:

Applied questions can initially feel surprising, because they require you to make sense of a scenario you have not seen in class before. However, once you get used to them they can be fun. You are never asked to solve questions that require you to work with outside knowledge that was not covered in the course. The trick with applied questions is to solve them using the covered concepts as investigative tools to make inferences and using the same logic or reasoning that we practiced in lectures.

To be ready to answer applied questions on the homework and the hour exams, make sure you have studied the material first in a way that you can explain WHY or HOW a process works! Then follow these steps to set-up the question:

a) Identify the core concept that is going to be relevant for this question.
b) Identify the activity in class where we practiced the logic needed to reason in a given system.
c) Compare and contrast: what is the same and what is different in this question compared to the case we went through in class?
d) Use causal reasoning to deduce the answer using the same line of reasoning as we practiced in class.
Run > Hide > Fight

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we’re faced with almost any kind of emergency – like severe weather or if someone is trying to hurt you – we have three options: Run, hide or fight.

Run
Leaving the area quickly is the best option if it is safe to do so.

- Take time now to learn the different ways to leave your building.
- Leave personal items behind.
- Assist those who need help, but consider whether doing so puts yourself at risk.
- Alert authorities of the emergency when it is safe to do so.

Hide
When you can’t or don’t want to run, take shelter indoors.

- Take time now to learn different ways to seek shelter in your building.
- If severe weather is imminent, go to the nearest indoor storm refuge area.
- If someone is trying to hurt you and you can’t evacuate, get to a place where you can’t be seen, lock or barricade your area if possible, silence your phone, don’t make any noise and don’t come out until you receive an Illini-Alert indicating it is safe to do so.

Fight
As a last resort, you may need to fight to increase your chances of survival.

- Think about what kind of common items are in your area which you can use to defend yourself.
- Team up with others to fight if the situation allows.
- Mentally prepare yourself – you may be in a fight for your life.

Please be aware of people with disabilities who may need additional assistance in emergency situations.

Other resources

- [police.illinois.edu/safe](http://police.illinois.edu/safe) for more information on how to prepare for emergencies, including how to run, hide or fight and building floor plans that can show you safe areas.

- [emergency.illinois.edu](http://emergency.illinois.edu) to sign up for Illini-Alert text messages.

- Follow the University of Illinois Police Department on Twitter and Facebook to get regular updates about campus safety.