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| **AP Biology** | **Curriculum Map****Organismal Behavior**http://www.jeffersontownship.org/Portals/0/Images/Logos/hornet.jpg |
| Textbook Resources:**Chapter 51 / Various Excerpts** | Month(s):**August-September** | Time Frame:**11 days (9/2 block)** | Assessment:**Reading Quizzes****Unit Test** |
| **Learning Targets** | **Support Text** | **Podcasts** |
| **EK 2.A.1: All living systems require constant input of free energy.** |
| 1. Organisms use free energy to maintain organization, grow and reproduce.
2. Organisms use various strategies to regulate body temperature and metabolism.
	* + - Endothermy
			- Ectothermy
3. Reproduction and rearing of offspring require free energy beyond that used for maintenance and growth. Different organisms use various reproductive strategies in response to energy availability.
	* + - Seasonal reproduction in animals
			- Seasonal reproduction in plants
			- Life history strategies (biennial/perennial plants)
4. There is a relationship between metabolic rate per unit body mass and the size of multicellular organisms generally, the smaller the organism, the higher the metabolic rate.
5. Excess acquired free energy versus required free energy expenditure results in energy storage or growth.
6. Insufficient acquired free energy versus required free energy expenditure results in loss of mass and, ultimately, the death of an organism.
 | **Thermoregulation**Chapter 40.3 (p.862-868)Figure 40.16 (p.868)**Reproductive Cycles**Chapter 46.1 (p.998-999)**Circadian Rhythm & Photoperiodism**Chapter 39.3 (p.835-841)**Biennial/Perenial**Chapter 35.2 (p.746-747)**Size & Metabolic Rate**Chapter 40.4 (p.870) | [Life Requires Free Energy](http://www.bozemanscience.com/012-life-requires-free-energy)[Thermoregulation](http://www.bozemanscience.com/thermoregulation/?rq=metabolism) |
| **EK 2.C.1: Organisms use feedback mechanisms to maintain their internal environments and respond to external environmental changes.** |
| 1. Negative feedback mechanisms maintain dynamic homeostasis for a particular condition (variable) by regulating physiological processes, returning the changing condition back to its target set point.
* Temperature regulation in animals
* Water retention by the kidneys
 | **Feedback Control**Chapter 40.2 (p.860-862)**Thermoregulation**Chapter 40.3 (p.862-868)**Regulation of Fluid Retention**Figure 44.19 (p.969) | [Homeostatic Loops](http://www.bozemanscience.com/homeostatic-loops)[Homeostasis Hugs](http://www.bozemanscience.com/homeostasis-hugs)[Homeostasis Review](http://www.bozemanscience.com/ap-homeostasis-review)[Positive & Negative Feedback Loops](http://www.bozemanscience.com/positive-and-negative-feedback-loops) |
| **EK 2.C.2: Organisms respond to changes in their external environments.** |
| 1. Organisms respond to changes in their environment through behavioral and physiological mechanisms.
* Hibernation and migration in animals
* Taxis and kinesis in animals
* Nocturnal and diurnal activity: circadian rhythms
* Shivering & sweating in humans
* Photoperiodism
* Phototrophism
* Gravitrophism
* Chemotrophism
 | **Hibernation**Chapter 40.4 (p.871-872)Figure 40.21 (p.782)**Behavioral Rhythms**Chapter 51.1 (p.1120)**Thermoregulation**Figure 40.16 (p.868)**Migration**Chapter 51.1 (p.1119-1120)**Phototrophism & Auxin**Chapter 39.2 (p.824-829)**Circadian Rhythm & Photoperiodism**Chapter 36.4 (p.777-778)Chapter 39.3 (p.835-841)**Gravitrophism & Chemotrophism**Chapter 39.4 (p.841-845) | [Response to External Environments](http://www.bozemanscience.com/019-response-to-external-envirnoments)[Behavior and Natural Selection](http://www.bozemanscience.com/026-behavior-and-natural-selection) |
| **EK 2.E.2: Timing and coordination of physiological events are regulated by multiple mechanisms.** |
| 1. In animals, internal and external signals regulate a variety of physiological responses that synchronize with environmental cycles and cues.
	* + - Circadian rhythms, or the physiological cycle of about 24 hours that is present in all eukaryotes and persists even in the absence of external cues
			- Diurnal/nocturnal and sleep/wake cycles
			- Jet lag in humans
			- Seasonal responses, such as hibernation, estivation and migration
			- Release and reaction to pheromones
			- Visual displays in the reproductive cycle
 | **Biological Clock Regulation**Chapter 49.2 (p.1070-1071)**Jet Lag**Chapter 40.2 (p.861-862)**Hibernation**Chapter 40.4 (p.871-872)Figure 40.21 (p.782)**Migration**Chapter 51.1 (p.1119-1120)**Animal Signals & Communication**Chapter 51.1 (p.1120-1122) | [Mechanisms of Timing and Control](http://www.bozemanscience.com/025-mechanisms-of-timing-and-control) |
| 1. In plants, physiological events involve interactions between environmental stimuli and internal molecular signals.
2. Phototropism, or the response to the presence of light
3. Photoperiodism, or the response to change in length of the night, that results in flowering in long-day and short-day plants
 | **Phototrophism & Auxin**Chapter 39.2 (p.824-829)**Circadian Rhythm & Photoperiodism**Chapter 36.4 (p.777-778)Chapter 39.3 (p.835-841) |
| **EK 4.B.2: Cooperative interactions within organisms promote efficiency in the use of energy and matter.** |
| 1. Organisms have areas or compartments that perform a subset of functions related to energy and matter, and these parts contribute to the whole.
2. Interactions among cells of a population of unicellular organisms can be similar to those of multicellular organisms, and these interactions lead to increased efficiency and utilization of energy and matter.
 | **Quorum Sensing**Chapter 11.1 (p.206-207) | [Mechanisms of Timing and Control](http://www.bozemanscience.com/025-mechanisms-of-timing-and-control) |
| **EK 2.E.3: Timing and coordination of behavior are regulated by various mechanisms and are important in natural selection.** |
| 1. Individuals can act on information and communicate it to others.
2. Innate behaviors are behaviors that are inherited.
3. Learning occurs through interactions with the environment and other organisms.
 | **Learning & Behavior**Chapter 51.2 (p.1123-1128) | [Animal Behavior](http://www.bozemanscience.com/animal-behavior/?rq=animal%20behavior) |
| 1. Responses to information and communication of information are vital to natural selection.
2. Behaviors in animals are triggered by environmental cues and are vital to reproduction, natural selection and survival.
* Hibernation
* Estivation
* Migration
* Courtship
 | **Hibernation**Chapter 40.4 (p.871-872)Figure 40.21 (p.782)**Migration**Chapter 51.1 (p.1119-1120)**Pheromones**Chapter 51.1 (p.1122)**Animal Signals & Communication**Chapter 51.1 (p.1120-1122) | [Behavior and Natural Selection](http://www.bozemanscience.com/026-behavior-and-natural-selection) |
| **EK 3.E.1: Individuals can act on information and communicate it to others.** |
| 1. Organisms exchange information with each other in response to internal changes and external cues, which can change behavior.
* Fight or flight response
* Predator warnings
* Protection of young
* Avoidance responses
* Plant-plant interactions due to herbivory
 | **Herbivory Response**Chapter 39.5 (p.845-847)**Altruism**Chapter 51.4 (p.1137)**Mating & Parental Care**Chapter 51.3 (p.1129-1134) | [Information Exchange](http://www.bozemanscience.com/039-information-exchange)[Response to External Environments](http://www.bozemanscience.com/019-response-to-external-envirnoments)[Behavior and Natural Selection](http://www.bozemanscience.com/026-behavior-and-natural-selection) |
| 1. Communication occurs through various mechanisms.
2. Living systems have a variety of signal behaviors or cues that produce changes in the behavior of other organisms and can result in differential reproductive success.
* Territorial marking in mammals
* Herbivory response
* Coloration in flowers
1. Animals use visual, audible, tactile, electrical and chemical signals to indicate dominance, find food, establish territory and ensure reproductive success.
* Bee dances
* Territorial marking in mammals
* Predator warning
* Colony and swarming behavior in insects
 | **Herbivory Response**Chapter 39.5 (p.845-847)**Pheromones**Chapter 51.1 (p.1122)**Animal Signals & Communication**Chapter 51.1 (p.1120-1122)**Territoriality**Figure 53.17 (p.1184)**Altruism**Chapter 51.4 (p.1137) |
| 1. Responses to information and communication of information are vital to natural selection and evolution.
2. Natural selection favors innate and learned behaviors that increase survival and reproductive fitness.
* Parent and offspring interactions
* Migration patterns
* Courtship and mating behaviors
* Foraging in bees and other animals
* Avoidance behavior to poisons
1. Cooperative behavior tends to increase the fitness of the individual and the survival of the population.
* Pack behavior in animals
* Herd, flock, and schooling behavior in animals
* Predator warning
* Colony and swarming behavior in insects
 | **Foraging Behavior**Chapter 51.3 (p.1128-1129)**Migration**Chapter 51.1 (p.1119-1120)**Mating & Parental Care**Chapter 51.3 (p.1129-1134)**Altruism**Chapter 51.4 (p.1137) |

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| **Vocabulary** |
| agnostic behavior | estivation | kin selection | polygyny |  |  |
| altruism | exothermic | learned behavior | positive feedback |  |  |
| altruistic behavior | fixed action pattern | metabolism | problem solving (insight) |  |  |
| associative learning | free energy | migration | promiscuous |  |  |
| auxin | gravitrophism | monogamous | quorum sensing |  |  |
| behavior | habituation | negative feedback | receptor |  |  |
| biennial plant | hibernation/torpor | nocturnal | response |  |  |
| circadian rhythm | homeostasis | observational learning | social learning |  |  |
| classical conditioning | imprinting | operant conditioning | stimulus |  |  |
| critical period | imprinting | perennial plant | territoriality |  |  |
| diurnal | inclusive fitness | pheromones | thermoregulation |  |  |
| dominance hierarchy | innate behavior | photoperiodism | thigmotrophism |  |  |
| effector | instinct | phototrophism | trophism |  |  |
| endothermic | intersexual competition | polyandry |  |  |  |