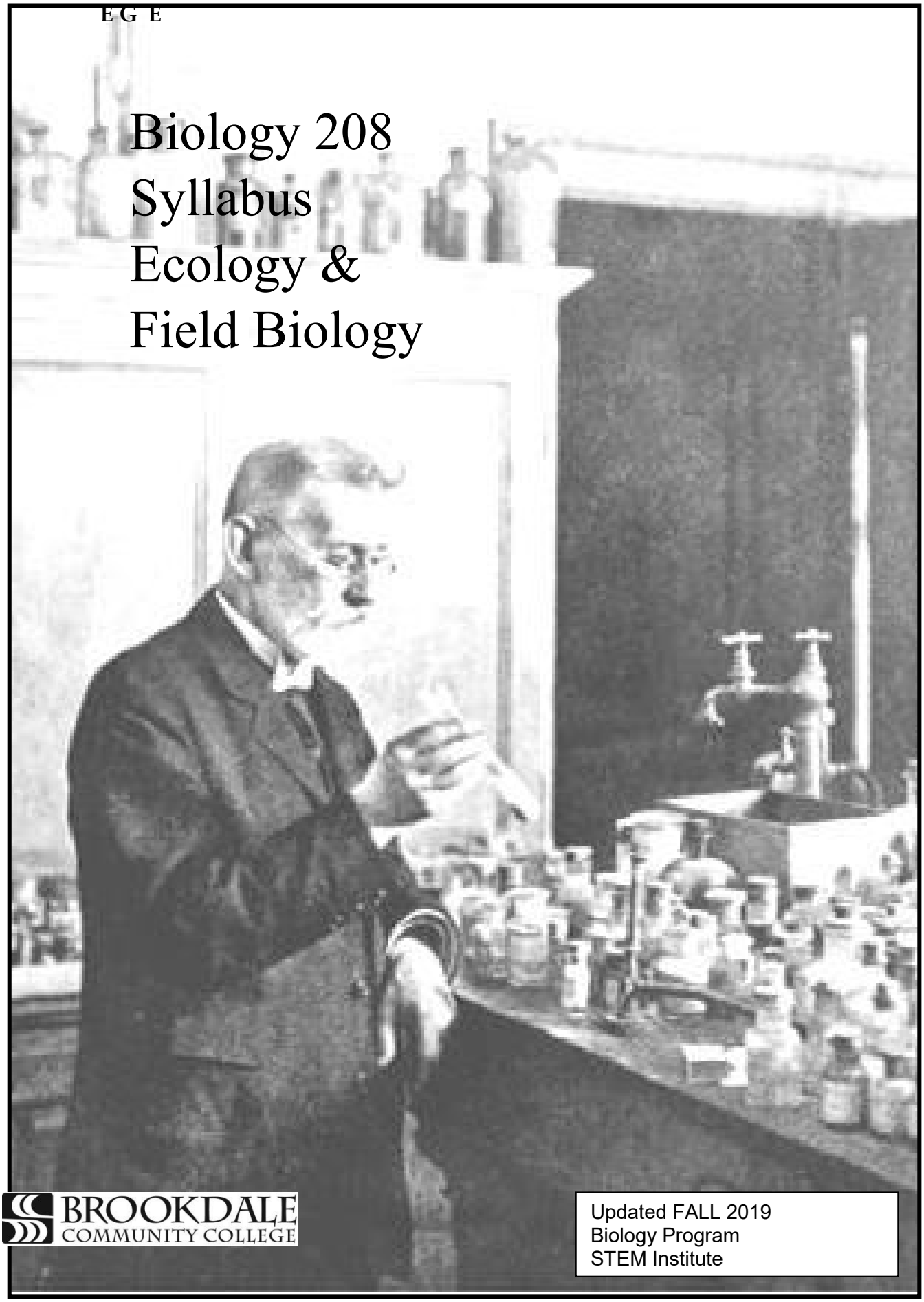
BROOKDALE COMMUNITY COLLEGE

# Biology 208 Syllabus Ecology & Field Biology



BROOKDALE COMMUNITY COLLEGE

Updated FALL 2019
Biology Program
STEM Institute

**Code**: **BIOL 208** **Title**: Ecology & Field Biology

**Division: STEM** **Department:** Biology

**Course Description:** This course is designed for science majors and for students enrolled in the Environmental and Earth Sciences Option. Through laboratory exercises and classroom experiences, the student will investigate and demonstrate an understanding of the processes regulating the distribution and abundance of living organisms. Topics include interactions among organisms and their environment, population ecology, community ecology, and the energy flow and trophic structure of ecosystems. Lecture, laboratory experiences and field trips are designed to introduce qualitative and quantitative methods for the measurement of factors and populations in field situations, procedures for recording and analyzing data, and coverage of current topics and trends in ecology.

**NOTE:** ***This course is offered only in the Fall Term.***

**Prerequisites:** A grade of C or higher in BIOL 102, and MATH 131

**Corerequisites:**

**Prerequisites or Corerequisites:**

**Credits**: **4** **Lecture Hours: 3** **Lab/Studio Hours: 3**

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***REQUIRED TEXTBOOK/MATERIALS:***
**TEXTBOOK:** Molles, Manuel Jr. 2019. ECOLOGY 8th Edition.
McGraw Hill Education ISBN: 978-1-259-88005-6

***ADDITIONAL TIME REQUIREMENTS***:
Additional weekly lab time in the Independent Study Laboratory (MAS 041) usually necessary for successful completion of the course.

***COURSE LEARNING OUTCOMES***:

- Analyze the influence of environmental factors on organismal success.
- Examine the impact of genetics on populations and understand reproductive strategiesof populations.
- Investigate the dynamics of community structure and compare how ecological interactions at one level of organization relate to processes and phenomena at all levels.
- Explain energy flow and nutrient cycling through ecosystems and its impact oncommunity members.

(Mathematical/Scientific Reasoning/Communication Skills/Critical Thinking/Information Literacy/Technological Literacy)

***GRADING STANDARD***:

**A student must have an average of 65% or better for the classroom component and an average of 65% or better for the laboratory component of the course in order to earn a passing grade for the course.**

Upon completion of the course, grades will be assigned as follows:

A = 92 – 100%
A- = 89 – 91%
B+ = 86 – 88%
B = 82 – 85%
B- = 79 – 81%
C+ = 76 – 78%
C = 70 – 75%
D = 65 – 69%
F = <65%

Unit examination results will be reported as the grade assigned by the faculty calculated to the first decimal place. These grades will be weighed according to course grading policy.

In calculating the course grade, 0.5 will round up to the next numerical grade and 0.4 will round down to the next lower numerical grade.

A grade of C or better is required in all pre-requisite courses. Career studies courses must have a grade of C or better to count toward the Mathematics / Science Program – Biology Option. Students are permitted to withdraw from the course without penalty until approximately 80% of the semester is complete. Please see term schedule for the exact deadline.

At the end of the semester, application for an Incomplete may be made if a student with proper documentation needs to complete no more than one lecture exam and/or one laboratory practical. The granting of an Incomplete is at the discretion of the instructor. Please see Instructor's syllabus for additional Grading Policies.

Successful course completion of Ecology & Field Biology is based on successful completion of both the lecture and laboratory components of this course. Lecture performance accounts for 75% of the final course grade and includes performance on exams/quizzes, presentations and formal written assignments. Laboratory performance accounts for 25% of the final course grade and includes performance on practicals, laboratory exercises and formal lab reports.

***COURSE CONTENT:***

***INTENDED UNIT OUTCOME [UNIT OBJECTIVES]***:

Unit One: The Science of Ecology
Unit Two: Population Ecology Unit Three: Community Ecology Unit Four: Ecosystems Ecology

***DEPARTMENT POLICIES***:

**Attendance** during class and laboratory sessions is strongly recommended for optimum performance in biology courses.

**Lecture exams** will be given in class.

**Laboratory exercises** will be assigned during laboratory sessions, in accordance with schedules provided by the instructor. Exams and laboratory experiences must be completed at the times designated by the instructor. A student who misses a lecture exam or laboratory experience must provide prior notification and proper documentation in order to take the exam or make-up the laboratory experience. The acceptance of said prior notification and proper documentation will be determined by the instructor.

**Documentation** must be provided within one week of the student's return to the classroom for a make-up exam or laboratory experience to be scheduled. A student who is unable to provide proper documentation for a missed exam or laboratory practical will be given a grade of zero for that exercise. Students may not re-take exams or laboratory practicals on which they perform poorly.

**Requirements** for course completion are listed in individual instructor syllabi.

***COLLEGE POLICIES***:
As an academic institution, Brookdale facilitates the free exchange of ideas, upholds the virtues of civil discourse, and honors diverse perspectives informed by credible sources. Our College values all students and strives for inclusion and safety regardless of a student's disability, age, sex, gender identity, sexual orientation, race, ethnicity, country of origin, immigration status, religious affiliation, political orientation, socioeconomic standing, and veteran status. For additional information, support services, and engagement opportunities, please visit www.brookdalecc.edu/support/

For information regarding:

- Brookdale's Academic Integrity Code
- Student Conduct Code
- Student Grade Appeal Process

Please refer to the BCC STUDENT HANDBOOK **AND** BCC CATALOG.

***NOTIFICATION FOR STUDENTS WITH DISABILITIES***:
Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Disabilities Services Office at 732-224-2730 (voice) or 732-842-4211 (TTY) to provide appropriate documentation of the disability, and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

***ADDITIONAL SUPPORT/LABS***:

BIOL 208 course and laboratory resources are available in CANVAS, Brookdale's Learning Management System, available via the Brookdale website: www.brookdalecc.edu

Independent Study Laboratory (Open Lab) – MAS 041 – is available to students enrolled in this biology course. Students use this lab to review lab materials, and to get help with course materials from lab instructors in the lab..

Brookdale Biology Department course and program information is available on the Biology Department website: https://www.brookdalecc.edu/stem-institute/biology/

**4 credits**

Name of Unit: **The Science of Ecology**
Textbook: Chapters 1, 2 and 3
Method of Evaluation: Unit tests, quizzes, articles/reports, and laboratory exercises

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 1. Define ecology and understand the levels of biological organization. | pages 6 – 8 |
| 2. List and describe the subdivisions in Ecology. | pages 7 – 8 |
| 3. List sciences allied to Ecology. | pages 8 – 10 |
| 4. Describe how a scientist would investigate a problem using the Scientific Method and …<br>• the limitations of experimental manipulation<br>• inferences in scientific research<br>• statistical analysis and mathematical modeling. | pages 10 – 15 |
| 5. Discuss how physical resources and limiting factors influence species distribution and abundance. Include:<br>• temperature<br>• water abundance and salinity<br>• nutrient availability | pages 46 – 52 |
| 6. Describe types of adaptive responses to the abiotic environment including homeostatic mechanisms and avoidance strategies. | pages 52 – 53 |
| 7. Describe adaptation as it relates to the following:<br>• thermal stress<br>• water balance<br>• light stimuli<br>• nutrient availability<br>• oxygen<br>• pH<br>• others | pages 53 – 73 |

**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 8. Describe the impact of adaptation on the evolution of a species. | page 18 |
| 9. Explain evolution in populations. Include:<br>• genetic variation<br>• fundamentals of population genetics<br>• conditions leading to evolutionary change | pages 18 - 21 |
| 10. Use the Hardy-Weinberg equation in studying population genetics. | pages 19 - 21 |
| 11. Describe mechanisms of evolution including:<br>• genetic drift<br>• gene flow<br>• natural selection | pages 21 - 25 |
| 12. Identify modes of natural selection including directional selection, stabilizing selection and disruptive selection. | pages 25 - 27 |
| 13. Discuss the concept of evolutionary stabile strategy. | pages 28 - 29 |
| 14. Describe sexual selection and kin selection. | pages 31 - 33 |
| 15. Discuss the concept of mimicry as it applies to interactions among species. | pages 34 - 35 |
| 16. Define symbiosis. | pages 35 - 43 |
| 17. Define co-evolution using host-parasite relationships. | pages 35 - 37 |

**4 credits**

Name of Unit: **Population Ecology**
Textbook: Chapters 4, 5, 6, 7 and 8
Method of Evaluation: Unit tests, quizzes, articles/reports, and laboratory exercises

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 1. Differentiate between demography and population. | pages 80 - 84 |
| Discuss general characteristics of a population and define density, crude density and ecological density. | pages 84 - 86 |
| 3. Describe dispersion. | pages 86 - 88 |
| 4. Demonstrate an understanding of age structure through the interpretation of Life Tables. | pages 88 - 93 |
| 5. Discuss human demography by comparing age pyramids of different cultures, time periods and genders. | page 94 |
| 6. Describe a survivorship curve and name the 3 general types of survivorship curves. | pages 93 - 97 |
| 7. Describe sex ratio. | pages 97 - 100 |
| 8. Discuss population growth and differentiate between exponential and logistic growth models. | pages 100 - 103 |
| 9. Define carrying capacity. | pages 102 - 103 |
| 10. Describe the purpose of transition matrices. | pages 103 - 105 |
| 11. Describe patterns of population fluctuations including cycling and irruptions. | pages 110 - 113 |

**BIOL 208 Ecology and Field Biology #2 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 12. Compare density-dependent and density-independent factors as they impact population regulation. | pages 113 - 114 |
| 13. Discuss the following factors as they impact population regulation:<br>• food supply<br>• predation<br>• disease<br>• stress and territoriality<br>• genetic polymorphism<br>• dispersal | pages 114 - 123 |
| 14. Differentiate between top-down and bottom-up control of community structure. | page 117 |
| 15. Discuss extinction and risk analysis including:<br>• demographic accidents<br>• habitat fragmentation<br>• genetic risks to small populations | pages 136 – 139 |
| 16. Define the term “Life History” and describe the 5 fundamental aspects of the Life History of a species:<br>• size<br>• metamorphosis<br>• diapause<br>• senescence<br>• reproductive patterns | pages 168 – 178 |
| 17. Explain the role of energetics in reproductive strategies. | page 178 |
| 18. Discuss trade-offs in reproductive strategies. | pages 178 - 182 |
| 19. Explain the Theory of *r* and *K* selection for a population based on size, mortality, survivorship, competition, and reproduction and development. | pages 182 – 185 |
| 20. Analyze constraints and ambiguities in the study of Life History strategies. | pages 185 – 187 |

**BIOL 208 Ecology and Field Biology #2 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 21. Discuss genetic mechanisms that affect variation in a population.<br>Include:<br>• mutation<br>• crossing over<br>• heterozygote advantage<br>• genetic drift<br>• inbreeding<br>• effective population size | pages 144 – 146 |
| 22. Describe methods of measurement of genetic variation within and among populations. | pages 146 – 155 |
| 23. Define morphologic variation. Distinguish between morphologic variation due to phenotypic plasticity and morphologic variations that are genetically based. | pages 146 – 149 |
| 24. Discuss the following chromosomal variations:<br>• chromosome rearrangements<br>• insertions<br>• deletions<br>• chromosome number<br>• aneuploidies | lecture/discussion |
| 25. Discuss the effect of chromosomal variation on phenotype. | pages 149, 150 |
| 26. Describe cline and discuss its significance in intraspecific variation. | lecture/discussion |
| 27. Distinguish between allozymes and isozymes. | pages 150 -153 |
| 28. Explain how allozymes are used to describe genetic variation in a population. | pages 150 – 153 |
| 29. Describe the use of gel electrophoresis in detecting allozymes. | lecture/discussion |

| | |
|---|---|
| 30. Discuss the process of DNA fingerprinting as it applies to intraspecific variation within a population. | pages 153, 154 |
| 31. Define mitochondrial DNA, explain its inheritance pattern, and explain its application as a molecular clock. | pages 154, 155 |

**BIOL 208 Ecology and Field Biology #2 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 30. Discuss the process of DNA fingerprinting as it applies to intraspecific variation within a population. | pages 153, 154 |
| 31. Define mitochondrial DNA, explain its inheritance pattern, and explain its application as a molecular clock. | pages 154, 155 |
| 32. Discuss the complex relationship between population, ecological processes, and genetic variation. | pages 155 - 164 |
| 33. Identify genetic and environmental components of behavior. | pages 192 - 194 |
| 34. Differentiate between innate behavior and learned behavior. | pages 192, 193 |
| 35. Describe mechanisms of behavioral interaction that have ecological significance. Include communication, aggression and territoriality. | pages 195 - 201 |
| 36. Discuss the social system exhibited by a species in terms of 3 fundamental components:<br>• group size and structure<br>• the mating system<br>• cooperation and helping | pages 201 - 213 |

**BIOL 208 Ecology and Field Biology #3 OF 4 Units**
**4 credits**

Name of Unit: **Community Ecology**
Textbook: Chapters 9, 10, 11, 12, 13
Method of Evaluation: Unit tests, quizzes, articles/reports and laboratory exercises

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 1. Define niche and habitat. | page 221 |
| 2. Distinguish between ecological niche and functional niche. | page 221 |
| 3. Discuss the concept of the Hutchinsonian Niche. | page 221 |
| 4. Identify important parameters of a niche including niche breadth and niche separation. | page 222 |
| 5. Define competition and distinguish between the numerous types of competition:<br>• Resource competition<br>• Preemptive competition<br>• Exploitation competition<br>• Interference competition<br>• Diffuse competition | pages 222, 223 |
| 6. Compare interspecific competition to intraspecific competition. | page 222<br>pages 226 - 228 |
| 7. Describe the phenomenon of allelopathy. | page 223 |
| 8. Discuss methods for obtaining evidence of competition:<br>• Experimentation<br>• Observation and inference | page 223-226 |
| 9. Identify the effects of competition. | page 228 |
| 10. Discuss the concept of character displacement as it relates to competition | pages 228 – 232 |

**BIOL 208 Ecology and Field Biology #3 OF 4 Units**
**4credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 11. Discuss the competitive exclusion principle. | page 232 |
| 12. Discuss the effect of invasive species on native species as a form of competition. | page 233 |
| 13. Define and provide examples of fugitive species. | page 234 |
| 14. Discuss the significance of the Lotka-Volterra graphical models in understanding species coexistence and describe their limitations as they relate to real populations. | pages 234 – 240 |
| 15. Define isocline. | page 235 |
| 16. Define predation and distinguish between carnivory and herbivory. | page 245 |
| 17. Identify types of herbivory including grazers, browsers, granivores, and frugivors. | page 245 |
| 18. Discuss parasitism as it relates to predation. | pages 245, 246 |
| 19. Identify predator adaptations to prey detection and recognition and tactics for capturing prey. | pages 246 - 249 |
| 20. Identify prey adaptations for avoiding predation including avoiding detection, avoiding capture, and disrupting predator handling. | pages 249 - 252 |
| 21. Identify herbivore adaptations to predation. | page 252, 253 |
| 22. Identify plant adaptations to avoiding herbivory, including structural and chemical adaptations. | pages 253 – 255 |

**BIOL 208 Ecology and Field Biology #3 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 23. Identify factors involved in the allocation of resources to morphological plant defense including:<br>• availability of plants to herbivores<br>• plant architecture<br>• seasonal scarcity<br>• involvement of specialized herbivores | pages 255, 256 |
| 24. Discuss the effects of herbivory. | page 256, 257 |
| 25. Discuss the optimal foraging theory and compare the optimal foraging models of optimal diet and the optimal use of food patches. | pages 257 - 260 |
| 26. Differentiate between functional and numerical responses to predation. | pages 260 – 262 |
| 27. Discuss the significance of Lotka-Voltera Graphical Models in examining conditions for coexistence of predator and prey. | pages 262 – 268 |
| 28. Discuss the advantages and disadvantages of using predators as biological control agents. | pages 264, 265 |
| 29. Discuss interspecific competition as a structuring force of communities. | pages 274 – 279 |
| 30. Distinguish between fundamental niche and realized niche. | pages 274 – 279 |
| 31. Discuss how extinction can occur as a result of niche specialization. | page 278 |
| 32. Discuss how patterns of species distribution are used to examine the role of competition in community organization. | page 279 |
| 33. Define the JP Morgan Effect, the Icarus Effect, and the Narcissus Effect. | pages 279 - 285 |

**BIOL 208 Ecology and Field Biology #3 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 34. Identify the keystone predator hypothesis and discuss the role of a keystone predator as a structuring force in communities. | pages 285 - 287 |
| 35. Discuss the role of disturbance on community structure. | page 288 |
| 36. Discuss the significance of patch dynamic models as a nonequilibrium approach in examining community structure. | pages 288 – 290 |
| 37. Define species diversity. | page 296 |
| 38. Discuss the relationship between species abundance and species diversity. | pages 298 – 300 |
| 39. Discuss the concept of total species richness. | pages 300 – 301 |
| 40. Describe geographic patterns of diversity:<br>• Islands<br>• Latitudinal trends<br>• Ecotones<br>• Deep ocean | pages 301 - 303 |
| 41. Discuss mechanisms that produce both low and high species diversity. | page 304 – 316 |
| 42. Discuss consequences of species diversity on community structure. | page 317 |
| 43. Discuss the impact of loss of species diversity on community structure:<br>• rivet hypothesis<br>• redundancy hypotheses | pages 317 – 320 |
| 44. Define succession. | pages 324 – 325 |
| 45. Distinguish between the processes of degradative and autotrophic succession. | page 325 |

**BIOL 208 Ecology and Field Biology #3 of 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 46. Discuss the two fundamental types of autotrophic succession: primary succession and secondary succession. | page 325 |
| 47. Define sere, seral stage and climax as they relate to succession. | page 325 |
| 48. Discuss the role of disturbance in communities. | pages 325 – 327 |
| 49. Discuss patterns of primary successional change using dune succession and succession after glaciation as examples. | pages 327 – 331 |
| 50. Discuss patterns of secondary successional change using old field succession and lodgepole pine forest succession as examples. | pages 331 – 335 |
| 51. Discuss possible variations in patterns of succession. | pages 335 – 336 |
| 52. Describe mechanisms of successional change using the following models:<br>• Connell-Slatyer Models<br>  ○ Facilitation model<br>  ○ Tolerance model<br>  ○ Inhibition model<br>• Tilman's Resource Model | pages 336 – 342 |
| 53. Discuss potential interactions among the succession models. | pages 342 – 343 |
| 54. Identify the significant role of herbivores in succession. | pages 343 – 345 |
| 55. Discuss the use of probabilistic models in examining succession. | pages 345 – 346 |
| 56. Describe the concept of climax and discuss how successional climax implies the existence of equilibrium within a community. | pages 347 - 351 |

**BIOL 208 Ecology and Field Biology #4 of 4 Units**
**4 credits**

Name of Unit: **Ecosystems Ecology**
Textbook: Chapters 14, 15, 16, 17 and 18
Method of Evaluation: Unit tests, quizzes, articles/reports, and laboratory exercises

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 1. Discuss the laws of thermodynamics and their significance in energy transfer within ecological systems. | page 358 |
| 2. Define primary production and distinguish between gross and net primary production. | pages 358 – 359 |
| 3. Define biomass. | page 359 |
| 4. Discuss the potential for measuring productivity. | pages 359 – 360 |
| 5. Identify patterns of primary production in both terrestrial and aquatic ecosystems. | pages 360 – 363 |
| 6. Discuss the influence of the following factors on production:<br>• Light<br>• Water<br>• Temperature<br>• Nutrients | pages 363 – 368 |
| 7. Define trophic level and identify the numerous levels of trophic structure. | pages 369 – 370 |
| 8. Discuss the use of food chains and food webs in depicting trophic structure. | pages 369 – 372 |
| 9. Use the following Lindeman efficiencies in discussing energy transfer between trophic levels:<br>• ingestion efficiency<br>• assimilation efficiency<br>• production efficiency | pages 372 - 374 |

**BIOL 208 Ecology and Field Biology #4 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 10. Use Eltonian pyramids to illustrate community trophic structure based on numbers, biomass, or energy content. | pages 374 - 375 |
| 11. Discuss the significance of food chain length and identify factors that determine food chain length. | pages 375 – 378 |
| 12. Discuss the concept of bioaccumulation and its impact on energy levels within trophic structure. | page 376 |
| 13. Describe the concept of a trophic cascade in controlling populations. | pages 378 – 379 |
| 14. Distinguish between top-down and bottom-up mechanisms of population control within trophic structure. | pages 378 – 379 |
| 15. Define biogeochemical cycling and discuss its role in degradative succession. | pages 382 – 384 |
| 16. Differentiate between volatile and sedimentary cycling. | page 384 |
| 17. Describe the major events and reservoirs associated with the carbon cycle. | pages 384 – 386 |
| 18. Describe the major events and reservoirs associated with the nitrogen cycle including denitrification, ammonification, nitrification and nitrogen fixation. | pages 386 – 388 |
| 19. Describe the major events and reservoirs associated with the phosphorous cycle. | page 388 |
| 20. Describe the major events and reservoirs associated with the sulfur cycle. | pages 388 - 391 |
| 21. Discuss the significance of acid precipitation on biogeochemical cycling. | pages 390 – 391 |

**BIOL 208 ECOLOGY and FIELD BIOLOGY #4 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 22. Discuss nutrient cycling through an ecosystem using northern hardwood forests, tropical forests and coral reefs as examples. | pages 391 - 397 |
| 23. Discuss the concept of nutrient budgets in studying the availability of select nutrients in an ecosystem. | page 397 |
| 24. Discuss the potential mechanisms and factors that control patterns of nutrient flux and cycling. | pages 397 - 399 |
| 25. Discuss the relationship between biotic communities and the physical environment. Pay particular attention to the role of vegetation. | pages 404 – 407 |
| 26. Describe how climate is one of the most important factors influencing the distribution of plants. Include temperature and precipitation in your discussion. | page 404 |
| 27. Discuss how altitude and latitude are major determinants of temperature and therefore have similar effects on vegetative distribution. | pages 404 – 405 |
| 28. Distinguish between the characteristics of maritime and continental climates. | page 405 |
| 29. Discuss the concept of rain shadow effect and explain how the presence and arrangement of mountain ranges are important determinants of precipitation. | pages 405 – 406 |
| 30. Describe how the direction a mountain slope faces influences the temperature regime and, indirectly, the amount of precipitation the slope receives. | pages 406 – 407 |
| 31. Discuss how midlatitude desertification is a consequence of the interaction between direct solar radiation at the equator and adiabatic cooling. | page 407 |

**BIOL 208 ECOLOGY and FIELD BIOLOGY #4 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 32. Describe Alfred Russell Wallace's attempt at community classification through his formation of six biotic realms. | pages 407 – 408 |
| 33. Define biome and discuss the use of flora as the major indicator of biome type. | pages 407 - 409 |
| 34. Compare and contrast the following terrestrial biomes based on geographic distribution, abiotic conditions, and indigenous flora and fauna:<br>• Tundra<br>• Taiga<br>• Coniferous forests<br>• Deserts<br>• Chaparral<br>• Grasslands<br>• Deciduous forests<br>• Tropical forests | pages 409 – 419 |
| 35. Distinguish between arctic and alpine tundra. | pages 409 - 410 |
| 36. Discuss how fire constitutes a major abiotic factor in taiga forests. | page 411 |
| 37. Distinguish between the three types of coniferous forests:<br>• Boreal forests<br>• Montane coniferous forests<br>• Coastal coniferous forests | pages 411 - 413 |
| 38. Distinguish between cold and hot deserts. | pages 413 - 414 |
| 39. Describe how vegetation of the chaparral have become highly adapted to recurrent fire. | page 415 |
| 40. Distinguish between the various types of grasslands including plains, prairies, steppes, savannas, veldts and pampas. | pages 415 - 416 |

**BIOL 208 ECOLOGY and FIELD BIOLOGY #4 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|

The student will be able to:

| | |
|---|---|
| 41. Discuss the variety of dominant tree species within the world's deciduous forests. | pages 417 - 418 |
| 42. Distinguish between lowland tropical rainforests, tropical cloud forests, and tropical deciduous forests. | pages 418 – 419 |
| 43. Discuss how alteration and destruction of biome habitats have a profound effect on global ecology. | page 420 |
| 44. Discuss how patterns of spatial habitat and variation in vegetation are major focuses in landscape ecology. | pages 421 - 425 |
| 45. Distinguish between lentic and lotic freshwater systems. | page 428 |
| 46. Discuss the numerous processes that allow for lake formation. | page 428 |
| 47. Distinguish between the trophogenic and tropholytic zones of lakes. | page 429 |
| 48. Define compensation point. | page 429 |
| 49. Describe seasonal variation in the temperature stratification of a lake and its influence on oxygen and nutrient concentration. | pages 429 – 430 |
| 50. Distinguish between the following biotic zones of a lake:<br>• Littoral zone<br>• Pelagic zone<br>• Limnetic zone<br>• Profundal zone<br>• Benthic zone | page 430 |

**BIOL 208 ECOLOGY and FIELD BIOLOGY #4 OF 4 Units**
**4 credits**

| Learning Objectives | Textbook Readings |
|---|---|
| The student will be able to: | |
| 51. Distinguish between oligotrophic and eutrophic lakes. | pages 430 – 431 |
| 52. Discuss the physical factors that play a crucial role in the ecology of lotic systems. | page 431 |
| 53. Describe the concept of river continuum. | page 431 |
| 54. Define wetlands and distinguish between marshes, prairie potholes, swamps and bogs. | pages 431 - 434 |
| 55. Discuss the tremendous value of wetland habitats both biotically and hydrologically. | page 432 |
| 56. Discuss how salinity, temperature, light availability, depth, currents, winds and tide impact the physical nature of oceans. | page 434 - 436 |
| 57. Describe the habitat zonation of marine environments. | page 436 - 437 |
| 58. Compare the following marine environments based on geographic distribution, abiotic conditions, and indigenous flora and fauna:<br>• Open ocean<br>• Hydrothermal vents<br>• Rocky intertidal zones<br>• Salt marshes<br>• Estuaries<br>• Mangroves<br>• Coral reefs | pages 436 - 437 |
| 59. Distinguish between fringing coral reefs, barrier coral reefs and coral atolls. | pages 441 – 443. |

*The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arises.*