

BIOLOGY 261: ECOLOGY
MESSIAH COLLEGE
FALL 2008
syllabus

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Research Interests: ecology of rain & cloud forests; population biology; animal behavior; conservation biology of amphibians

Course Web Site: <http://home.messiah.edu/~quist/ecology.htm>

Lecture: Tuesday/Thursday 10:30 - 11:45 am, Kline 120

Office Hours:

- Monday/Wednesday 12:15-1:15 pm
- Tuesday/Thursday 1:15-3:00 pm
- By appointment (e-mail me, **don't leave voice mail**)

TEXTS

1. Molles, M.C. 2008. *Ecology: concepts and applications*. 4th ed. WCB-McGraw-Hill.
2. Journal and supplemental readings as assigned.

GENERAL STATEMENT

Ecology is the study of the causes of the abundance, distribution, population dynamics, and diversity of coexisting species. In essence, the study of these patterns reveals how creatures have worked out God's Genesis command to be fruitful, multiply, and fill the face of the earth. Such study also reveals how God has provided and will continue to provide for the marvelous diversity of life on earth: each species according to its kind and according to its time. As we explore these patterns, I trust that we expand our view of the Creator as reflected by the way he cares for all of creation. Our understanding of creation and our God-appointed role as environmental stewards will be extensively discussed.

Ecologists necessarily draw from other scientific disciplines such as atmospheric sciences, chemistry, and physics. They must have an understanding of how populations of organisms change in response to their environment (selection and adaptation). As ecologists, we will examine the ecology of individuals, populations, communities, and ecosystems in an area or region. It will be impossible to critically consider all interesting aspects of ecology in one semester. Rather, we will restrict ourselves to fundamental principles but venture into more critical consideration of a few select areas.

GRADING

Evaluation Activities

Unit Exams (3 exams)	300
Final Exam*	150
Group Poster Presentation	150
<u>Field Observations (four reports)</u>	<u>100</u>
Total Points	700

Use the following percentage (point) scale as you establish your grade for Biology 261:

A = 93-100 (700-650)	A- = 90-92.9 (649-629)	B- = 80-82.9 (606-559)
B+ = 87-89.9 (628-608)	B = 83-86.9 (607-580)	C- = 69-71.9 (502-482)
C+ = 77-79.9 (558-538)	C = 72-76.9 (537-503)	
D = 65-68.9 (481-454)	F = Below 65 (<454)	

*Students possessing a combined exam average of 93% or higher at the end of the semester may opt to use their average toward the 100 point cumulative portion of the 150 point final exam.

GRADING RUBRIC

Quality/ Characteristic	A – Honor – Outstanding	B – Excellent Above Average	C – Good – Average	D – Poor – Below Average	F – No credit Unsatisfactory
1. Interest and ability to communicate.	Almost always shows creativity, sound judgement, intellectual curiosity and communicates correctly and clearly	Frequently shows creativity, sound judgment, intellectual curiosity and communicates correctly and clearly	Shows sustained interest and is able to communicate well and understandably.	Exhibits interest. Marginal performance in communicating	Shows sub-minimal interest. Does not communicate clearly enough to get ideas across.
2. Performance skills of discipline.	Almost always analyzes critically, synthesizes creatively, uses facts in original thinking, and generalizes logically.	Frequently analyzes critically, synthesizes creatively, uses facts in original thinking, and generalizes logically.	Usually produces viable generalizations and satisfactorily organizes data.	Commits errors in fact and judgment when discussing material and has difficulty going beyond gathering and examining facts and data.	Does not comprehend the concepts and ideas which are a part of the course. Does not gather and examine facts and data satisfactorily.
3. Techniques of scholarship.	Shows sound techniques in all projects and uses knowledge effectively.	Shows sound techniques in most projects and uses knowledge effectively.	Good understanding of techniques in most projects.	Demonstrates minimal competence in the techniques of scholarship.	Does not use sound techniques of scholarship.
4. Meeting requirements of the course—in preparation, outside reading and class participation, etc.	Meets or exceeds stated course requirements with distinction in all aspects.	Meets or exceeds stated course requirements with excellence in most aspects.	Meets stated course requirements with adequate performance in all aspects.	Meets stated course requirements with adequate performance in some aspects.	Does not meet the standards and requirements.

POSTER PRESENTATION

There will be a **5-8 minute group oral presentation** on a poster synthesizing the refereed literature **on an ecological topic**. Points will be given for oral delivery and poster quality (120 pts). Students will be given their group assignments on Thursday, September 27th: instructions will be given to students on topics, expectations, and format.

FIELD OBSERVATIONS: HOW TO KEEP A FIELD JOURNAL

- adapted from the American Museum of Natural History

I will expect to receive your reflections on **four** field excursions. Three of these field excursions must be off campus in a state or national park or forest. Field observations are essential to a scientist's fieldwork, and are important to this ecology course. When you go on your field excursions, you should record all your observations, thoughts and questions in your field journal. Your field observations will be unique to you, reflecting your personal style. For each of your five experiences, at least **2 fully typed, single spaced pages (1 inch margins & 12 pt. Times New Roman font)** are expected. Please include one

inserted digital photo or field sketch within each write up (not to take up any part of your two full typed pages. If I receive only one page, then you will receive 12.5/25 for the exercise. Be careful to not use the MS Word 1.25" margin default.

Some people record their observations with charts, list and labels, while others will write long, detailed descriptions. Think of some questions that may help you get started:

"What do I see?"

"Do I see anything that surprises me?"

"What tools do I have?"

"Who is with me on this expedition?"

"What time of day is it?"

EXTRA CREDIT

Each exam will contain up to 5 extra credit points. Also, up to 5 points of extra credit will be awarded to students that write five, small single-paragraph reports on presentations given at the senior research symposium at the end of the semester. Other than this, there will be no other extra credit opportunities. **Please do not ask for more extra credit.** The best way to achieve the grade is to **STUDY!**

ATTENDANCE

To sum this up, students and their professor mutually expect courtesy one to another. Lecture attendance is expected, but not mandatory. However, students are adults and can manage their time as such. However, if I deem class attendance as being low, I will claim the authority to reward the attending students with an easy "pop" quiz. If you miss class on lecture days, then I don't want to hear a litany of excuses. **If you are unable to be present for an exam**, every effort should be made to let me know **before** the exam. Exams missed for unexcused reasons **will not** be made up.

Make-up Exam Policy - Make-up examinations will be given to students **ONLY** under three conditions:

- **SERIOUS** illness that is verified by a **note from a physician** or the health service.
- **FAMILY EMERGENCY** must be determined and verified by a **note from the Dean of Students**.
- **APPROVED SCHOOL FUNCTION** for which you have made arrangements and verification with me **ahead of time (48 hours beforehand)** by e-mail.

NO exceptions to these policies will be made. The College has provided sufficient travel days for Fall and Thanksgiving Breaks. Missing exams given before these breaks will be unexcused so take appropriate measures to find rides home according to the actual break dates.

IN-CLASS COMPUTER POLICY

Except in cases verified by a medical note, students may not use computers in class.

AMERICANS WITH DISABILITIES ACT

Any student whose disability falls within ADA guidelines should inform the instructor **AT THE BEGINNING** of the semester of any special accommodations or equipment needs necessary to complete the requirements for this course. Students must register documentation with the Office of Disability Services (Hoffman 101). If you have questions, call extension 5382.

Tentative Class Schedule → Fall 2008

- T Sept. 2 **Introductions – Syllabus & Course Policies**
R Sept. 4 **Campus Field Lecture:** Molles, Ch.1 Introduction: What is Ecology?
T Sept. 9 **Life on Land- Climatic Patterns:** Molles, Ch. 2 Life on Land
R Sept. 11 **Life on Land- Geography of Biomes:** Molles, Ch. 2 Life on Land
T Sept. 16 **Geography of Biomes (cont.) & Life in Water- The Hydrologic Cycle:** Molles Ch. 3
R Sept. 18 **Literature Searching/ Life in Water- The Hydrologic Cycle:** Molles Ch. 3
T Sept. 23 **Life in Water (cont.)**
R Sept. 25 **Temperature Relations:** Molles Ch. 4
T Sept. 30 **Water Relations:** Molles Ch. 5
- R Oct. 2 EXAM #1 — MOLLES CHAPTERS 1-5 (100 pts.)**
- T Oct. 7 **Research Day** (Beth Transue)
R Oct. 9 **Fall Break**
T Oct. 14 **Energy and Nutrient Relations:** Molles Ch. 6
R Oct. 16 **Social Relations:** Molles Ch. 7
T Oct. 21 **Population Genetics and Natural Selection:** Molles Ch. 8
R Oct. 23 **Population Distribution and Abundance:** Molles Ch. 9
T Oct. 28 **Population Dynamics:** Molles Ch. 10
- R Oct. 28 EXAM #2 — MOLLES CHAPTERS 6-10 (100 pts.)**
- T Nov. 4 **Population Growth:** Molles Ch. 11
R Nov. 6 **Life Histories:** Molles Ch. 12
T Nov. 11 **Competition:** Molles Ch. 13
R Nov. 13 **Relationships Among Species- Parasites, Pathogens and Mimics:** Molles Ch. 14
T Nov. 18 **Relationships Among Species- Parasites, Pathogens and Mimics (cont.)**
R Nov. 20 **Mutualism:** Molles Ch. 15
- T Nov. 25 EXAM #3 — MOLLES CHAPS 11-15 (100 pts.)**
- R Nov. 27 **Thanksgiving Recess**
T Dec. 2 **Species Abundance and Diversity:** Molles Ch. 16
R Dec. 4 **Primary Production and Energy Flow:** Molles Ch. 18
T Dec. 9 **Succession and Stability:** Molles Ch. 20
R Dec. 11 **Poster Symposium**
- M Dec. 17 FINAL EXAM — MOLLES CHAPTERS 16,18 & 20 (35 pts.) and CUMULATIVE (115 pts.)
10:30am-12:30pm**

Messiah College's Policy Regarding Academic Integrity

Personal integrity is a behavioral expectation for all members of the Messiah community: administration, faculty, staff, and students. Violations of academic integrity are not consistent with the community standards of Messiah College. These violations include:

1. **Plagiarism:** Submitting as one's own work part or all of any assignment (oral or written) which is copied, paraphrased or purchased from another source, including on-line sources without the proper acknowledgment of that source. Examples: failing to cite a reference, failing to use quotation marks where appropriate, misrepresenting another's work as your own, etc..
2. **Cheating:** Attempting to use or using unauthorized material or study aids for personal assistance in examinations or other academic work. Examples: using a cheat sheet, altering a graded exam, looking at a peer's exam.
3. **Fabrication:** Submitting altered or contrived information in any academic exercise. Examples: falsifying sources and/or data, etc.
4. **Misrepresentation of Academic Records:** Tampering with any portion of a student's record. Example: forging a signature on a registration form or change of grade form.
5. **Facilitating Academic Dishonesty:** Helping another individual violate this policy. Examples: working together on an assignment where collaboration is not allowed, doing work for another student, allowing one's own work to be copied.
6. **Computer Offenses:** Altering or damaging computer programs without permission. Examples: software piracy, constructing viruses, introducing viruses into a system, copying copyrighted programs, etc.
7. **Unfair Advantage:** Attempting to gain advantage over fellow students in an academic exercise. Examples: lying about the need for an extension on a paper, destroying or removing library materials, etc.

Violations of Academic Integrity Policy

1. If a violation of the Academic Integrity Policy is suspected, the faculty member should meet with the student(s) to discuss the incident and determine to the faculty member's satisfaction whether or not a violation has occurred. Faculty members may choose to have a witness present at the discussion.
2. If a student is accused of violating the academic integrity policy, but subsequently the faculty member determines that the student is innocent or insufficient evidence exists to justify further action, the student should be informed of this determination in writing. No report of the accusation or of the faculty/student meeting should be filed with the Academic Dean.
3. If the faculty member determines that a violation has occurred, a report should be filed with the Academic Dean and a duplicate of the report should be provided to the student. The report should include the following:
 - a. Complete description of the incident including date of meeting with the student.
 - b. Conclusions and sanctions reached as a result of the meeting.This information will be kept on file until a student is graduated.
4. The faculty member should keep originals of tests, papers, etc. that provide evidence of the violation.

Penalties for Violations of the Academic Integrity Policy

A faculty member may exercise broad discretion when responding to violations of the academic integrity policy. The range of responses may include failure of the course to a grade reduction of the given assignment. The typical consequence for violations will be failure of the assignment. Some examples of serious offenses which might necessitate the penalty of the failure of the course include: cheating on an examination, plagiarism of a complete assignment, etc. Additionally, the faculty member should notify the office of the Academic Dean. The faculty member should communicate to the student in writing whenever a grade reduction or failure of the course occurs due to a violation of the academic integrity policy. With issues related to computer offenses or misrepresentation of academic records, the case may be referred to the Student Judicial Council for processing.

If a staff member or an administrator discovers violations of the academic integrity policy he/she should contact the Academic Dean who will contact the student.

Penalties for Multiple Violations of the Academic Integrity Policy

The policy of the college is to act, whenever possible, in redemptive rather than merely punitive ways. We believe that simply to ignore an offense is to be neither loving nor redemptive. Consequently, the following procedure will be followed:

- If a second report of a violation of the academic integrity policy is received by the Academic Dean's office, the student will be required to meet with the Academic Dean. Suspension of the student or other appropriate sanctions may occur after the second offense at the discretion of the Academic Dean. A student may appeal the decision of the Academic Dean by appealing to the Provost, whose decision will be final.

Appeals Process for Violations of the Academic Integrity Policy

The student may appeal in writing to the academic department in which the course is offered. A student's intent to appeal a faculty member's response to a violation must be communicated to the department chairperson in writing within one week of the receipt of the written notification from the faculty member dealing with the incident. The decision of the academic department may be appealed to the Academic Standing Committee of the Dean's Council.

Honor Code Agreement

Terms and conditions for students taking Ecology

By enrolling in this course, the student agrees to the following terms and conditions:

1. **Regarding Plagiarism:** I will not use or represent the work of another as my own. This specifically includes the use of other students' work, WWW resources, and published works. I understand that citation of each source is expected and a part of the ethical practice of science and learning.

2. **Regarding Cheating:** I will abide by the instructions on exams, tests, quizzes and homework assignments when they are labeled or assigned as closed book, individual effort or other such designation of assistance or period of performance. I further understand that it is my ethical duty, on my honor, that I abide by these instructions even in the absence of an instructor or exam proctor.

3. **Regarding Knowledge of Violators:** I will be honor bound to report immediately all violations of the Honor Code of which I have first-hand knowledge. I understand that a failure to do so shall be a violation of the Honor Code. I understand that students found guilty of a violation shall be failed in the course and potentially dismissed from the College.

4. **Regarding Messiah College's Academic Honesty Policy:** I pledge to abide by the Messiah College Academic Honesty Policy for all work concerning this course.

Pledge of Honor: All course work submitted for evaluation is pledged with the student's signature. This signature henceforth is tantamount to pledging the following:

"I pledge that I will not plagiarize nor cheat in this course, and I report any violations of the Honor Code Agreement by others."

Signature

Printed Name

SELECT BIBLICAL REFERENCES TOWARDS A THEOLOGY OF NATURE (by Joseph Sheldon)

Original Created Order

Genesis 1 -- several verses (9, 18, 21, 25, and 31) Creation is proclaimed to be "good".
Genesis 1:26 (humans made in God's image)
Genesis 1:28 (the "dominion" passage)
Genesis 2:15 (Till -- compare with Joshua 24:15; keeping -- compare with Numbers 6:24)
Genesis 2:19-20 (What is the significance of naming?)

The Breaking of Relationships

Genesis 3:17-18 (results of our disobedience)
Genesis 9 (God's covenant Noah & every living creature)
Leviticus 25 & 26 (Land use instructions & consequences when the land is not given its Sabbath rest).
2 Chronicles 36:20-21
Isaiah 24:4-6 (the covenant is probably that referred to in Genesis 9)
Hosea 4:3 (results of our disobedience)
Jeremiah 12:4 (results of our disobedience)
Ezekiel 34:18 (admonishment not to pollute & destroy the sustainability of creation -- compares with green pastures & still waters of Psalm 23).

Redemption & Restoration

John 3:16 (world = Cosmos?) see footnote to this verse in the NIV Study Bible
Romans 8:19-22 (who are the "sons of God" & the "children of God")
Colossians 1:16-20 (see footnote in NIV Study Bible)
II Corinthians 5:18 (those who are reconciled have the ministry of reconciliation)

Other Important (& Delightful) Passages

Job 36:27 through chapter 41	Psalm 24:1-2
Psalms 8 & 19	Psalm 33:6-9
Psalm 50:10-12	Psalm 65
Psalm 96:11-12	Psalm 115:15-16
Psalm 104	Hosea 2:18-20
I Kings 4:29-34 (Solomon teaches about the creation -- a biology lesson)	
Job 12:7-10 ("But ask the animals & they will teach you...")	
Revelation 4:11	Revelation 11:18
Revelation 21-22	Isaiah 55:10-13

SELECTED REFERENCES ON THE THEOLOGY OF NATURE AND RELATED TOPICS

- Birch, B. C. 1988. Nature, Humanity, & Biblical Theology: Observations Toward a Relational Theology of Nature. In *Ecology & Life: Observations Toward a Relational Theology of Nature*. Edited by W. Granberg-Michaelson. Waco, TX: Word Books. PP. 143-150.
- Bauckham, R. 1986. First Steps to a Theology of Nature. *The Evangelical Quarterly* 58(3):229-244.
- DeWitt, Calvin B. 1994. *Christian Environmental Stewardship: Preparing the Way for Action*. Perspectives on Science & Christian Faith 46(2):80-89.
- Krueger, F. W., ed. 1988. A Theology of Creation & Redemption, in *Christian Ecology: Building an Environmental Ethic for the twenty-first Century*. San Francisco: The North American Conference on Christianity & Ecology. Pp. 114-115.
- Dumbrell, W. 1985. Genesis 1-3, Ecology & the Dominion of Man. *Crux* 21(4):16-26.
- Manahan, R. 1989. Christ as the Second Adam. Pages 45-56 in *The environment & the Christian: what can we learn from the New Testament?* Grand Rapids: Baker Book House. MI.
- Meye, R. P. 1987. Invitation to Wonder: Toward a Theology of Nature. In *Tending the Garden: Essays on the Gospel & the Earth*. Edited by Granberg-Michaelson, W. Grand Rapids, MI: Eerdmans Publishing Company. Pp. 30-49.
- Moltmann, J. 1986. The Cosmic Community: A New Ecological Concept of Reality in Science & Religion. *Ching Feng* 29(2-3):93-105

- Rimbach, J. A. 1988. "All Creation Groans": Theology/Ecology in St. Paul. In *Ecology & Life: Observations Toward a Relational Theology of Nature*. Edited by W. Granberg-Michaelson. Waco, TX: Word Books. PP. 161-177.
- Santmire, H. P. 1988. God's Joyous Valuing of Nature. In *Ecology & Life: Observations Toward a Relational Theology of Nature*. Edited by W. Granberg-Michaelson. Waco, TX: Word Books. PP. 178-181.
- Sheldon, J. K. 1989. Twenty-One Years After "The Historical Roots of Our Ecologic Crisis" How Has the Church Responded. *Perspectives on Science & Christian Faith* 41(3):152-158.
- Sheldon, J. K. 1990. Creation Rediscovered. *World Christian* 9(4):10-19.
- Van Leeuwen, R. 1990. Resurrection & the Vindication of Creation. Pages 57-71 in *The environment & the Christian: what can we learn from the New Testament?* Grand Rapids: Baker Book House. MI.
- White, L. 1967. The Historical Roots of Our Ecologic Crisis. *Science* 155: 1203-1207.
- Wright, Richard T. 1995. Tearing Down the Green: Environmental Backlash in the Evangelical Sub-Culture. *Perspectives on Science & Christian Faith* 47:2:80-91.
- Zerbe, G. 1990. The Meaning of the Kingdom of God for Stewardship of Creation. Pages 73-92 in *The environment & the Christian: what can we learn from the New Testament?* Grand Rapids: Baker Book House. MI.

RECOMMENDED CHRISTIAN BOOKS ON THE CARE OF CREATION

- Bhagat, S. P. (1990). *Creation in crisis: responding to God's covenant*. Elgin, Illinois: Brethren Press.
- Bratton, S. P. (1992). *Six billion & more: human population regulation & Christian ethics*. Louisville, KY: John Knox/Westminster Press.
- Bruggemann, Walter. (1993) *Using God's resources wisely: Isaiah & urban possibility*. Louisville: Westminster/John Knox Press.
- Campolo, T. (1992). *How to rescue the earth without worshipping nature*. Nashville: Thomas Nelson Publishers.
- DeWitt, C. B., Ed. (1991). *The environment & the Christian: what can we learn from the New Testament?* Grand Rapids: Baker Book House.
- DeWitt, C. B. & G. T. Prance, Eds. (1992). *Missionary Earthkeeping*. Macon, Georgia: Mercer University Press.
- Granberg-Michaelson, W. (Ed.) (1987c). *Tending the garden: essays on the gospel & the Earth*. Grand Rapids: Eerdmans.
- Granberg-Michaelson, W. (1988). *Ecology & life: accepting our environmental responsibility*. Waco, TX: Word.
- Hall, D. J. (1990). *The steward: a biblical symbol come of age*. New York: Friendship Press.
- Larson, D & S. Larson. (1992). *While creation waits: a Christian response to the environmental challenge*. Wheaton, IL: Harold Shaw Publishers.
- Nash, J. A. (1991). *Loving nature: ecological integrity & Christian responsibility*. Nashville, TN: Abingdon Press.
- Sheldon, J. K. (1992). *Rediscovery of creation: a bibliographical study of the church's response to the environmental crisis*. Metuchen, NJ: The American Theological Library Association & The Scarecrow Press, Inc.
- Sider, R. J. (1990). *Rich Christians in an age of hunger* (3rd ed.). Downers Grove, IL: Inter-Varsity Press.
- Van Dyke, F., D. Mahan, J. K. Sheldon, & R. Brand. (1996). *Redeeming Creation: the Bible & environmental stewardship*. InterVarsity Press.
- Wilkinson, L., Ed. (1991). *Earthkeeping in the '90s: stewardship of creation*. Grand Rapids: William B. Eerdmans Publishing Company.
- Wilkinson, L. & M. R. Wilkinson. (1992) *Caring for creation in your own backyard: over 100 things Christian families can do to help the earth*. Ann Arbor: Vine books by Servant Publications.
- Young, R. A. (1994) *Healing the earth: a theocentric perspective on environmental problems & their solutions*. Nashville, TN: Broadman & Holman Publishers.

PRACTICAL REFERENCE MATERIAL AND SOURCES

- Earth Care Paper Inc. A catalogue of paper products made from recycled paper. Includes cards, gift wrap, stationery, tablets, copy & computer paper, etc. Call (608) 277-2900 or write to Earth Care paper Inc.. P.O. Box 7070, Madison, WI 53707-7070
- Getis, Judith. 1991. You can make a difference: help protect the earth. Dubuque, IA: Wm. C. Brown Publishers. 88 pages. A small paperback book packed with practical ways that individuals can employ to reduce their impact on Creation.
- Henderson, Carrol L. 1981. Landscaping for wildlife. Published by Minnesota's Bookstore. For copies write: Minnesota's Bookstore, 117 University Avenue, St. Paul, MN 55155. Telephone #: 1-800-652-9747. Excellent source of information.
- The Earth Works Group. 1989. 50 simple things you can do to save the earth. Berkeley, CA: Earthworks Press. Highly popular book with many helpful suggestions.
- The Earth Works Group. 1990. 50 simple things kids can do to save the earth. Kansas City: Andrews & McMeel, A Universal Press Syndicate Company.
- Seventh Generation: Products for a Healthy Planet. A catalogue of environmentally safe products. For information, call 1-800-456-1177
- Brooklyn Botanic Garden. 1987. Gardening for wildlife. Excellent 64 page booklet. Write to Brooklyn Botanic Garden, Brooklyn, N.Y. 11225 for information
- Real Goods. A mail-order company selling environmentally friendly products. Call 1-800-762-7325 to receive a catalog.