

Fundamentals of Sustainability

SUST 1103

University of Arkansas

Faculty

Natural Systems	Prof. Steve Boss	STOS F09, 575-7134	sboss@uark.edu
Built Systems	Prof. Tahar Messadi	EG BALL 610, 575-7102	tmessadi@uark.edu
Managed Systems	Prof. Jennie Popp	Agri 223A, 575-2279	jhpopp@uark.edu
Social Systems	Prof. Zola Moon	HMGH 203, 575-5123	zmoon@uark.edu

Teaching Assistants

Toni Menninger	Stonehenge 5, 479-444-7748	amenning@uark.edu
John Kester III	Stonehenge 5, 573-286-4482	jkester@uark.edu
Johnnie Chamberlin	Stonehenge 4, 501-590-6615	jfchambe@uark.edu

Location

Auditorium BELL – Room 2282

Time

M-W-F 11:30 am-12:20 pm

Prerequisites

None

Term

Spring 2012

Office Hours:

Dr. Boss	M-W	2:00 pm - 5:00 pm
Dr. Messadi	W-F	8:00 am – 9:30 am
Dr. Popp	MWF	9:30 am-10:20 am
Dr. Moon	M-W	9:00 am -10:30 am
Toni Menninger	W	2:00 pm – 5: 00 pm
John Kester III	Tu-Th	9:00 am – 11:00 am
Johnnie Chamberlin	M	1:30 pm – 4:30 pm

Recitation Hours:

Toni Menninger	Th	2:00 pm – 4: 00 pm
John Kester III	W	2:00 pm – 4: 00 pm
Johnnie Chamberlin	Tu	2:15 pm – 4: 15 pm
Location: Enhanced Learning Center Room 44, Gregson Hall		

Academic Integrity

“As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail.”

“Each University of Arkansas student is required to be familiar with and abide by the University’s ‘Academic Integrity Policy’ which may be found at <http://provost.uark.edu/245.php>.

Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.”

Purpose and Goals

Fundamentals of Sustainability is an interdisciplinary course designed to introduce undergraduate students to basic concepts and theories of sustainability at global, regional and local levels. The course is organized around four major thematic areas of sustainability: social systems, natural systems, managed systems and built systems.

The aim of this course is to increase the environmental literacy of students and pave the way for both the creative and persistent engagement of sustainability concerns into the students' own disciplines.

Course Blackboard Login

<https://learn.uark.edu/webapps/login/>

Material for this course including syllabus, homework, class notes, test reviews and links to suggested reading materials can be found through Blackboard via the above link. The name of the course listed on Blackboard is SUST 1103- Fundamentals of Sustainability.

Reading and Supporting Materials

We have endeavored to identify appropriate course materials from resources available online. These resources are also available at no cost to students (YAY! Free Stuff!). We have identified these resources to reduce the overall cost of education for you by eliminating the need for a traditional textbook. However, we wish to emphasize the linked readings are **REQUIRED READINGS** for SUST 1103. It is the responsibility of you, the student, to access these readings online and read them prior to their assigned date on the syllabus. Classroom lectures and discussions will be based on content in these readings and it is our expectation that you will be knowledgeable of this content when you come to class. These resources were chosen to enhance the learning experience of students enrolled in SUST 1103 and represent (in our view) important scholarly contributions to fundamental principles of sustainability – indeed, several of the assigned readings for this course are the foundational documents that first articulated fundamental principles of sustainability, and, in at least one case, provided the modern definition of the word 'sustainability'. Understandably, you may not have prior familiarity with the discipline from which these readings were taken, but this is an interdisciplinary course and as part of your university experience, you should be exposed to grand ideas from fields outside your chosen major. The documents we have chosen are of a non-technical nature and intended to be understood by individuals with moderate levels of education, so you should not feel intimidated or anxious about reading any of these works. Additional reading will be posted on Blackboard, as indicated in the syllabus.

Course Grade Points Distribution

Your grade in this course will be based on the following:

In Class Exams	60%
Exam 1	1500 points
Exam 2	1500 points
Exam 3	1500 points
Exam 4	1500 points
Exams Total	6000 points
Service	8%
Service Requirement	8 hours of service
Service Total	800 points

Homework Assignments**16%**

Homework 1	200 points
Homework 2	200 points
Homework 3	200 points
Homework 4	200 points
Homework 5	200 points
Homework 6	200 points
Homework 7	200 points
Homework 8	200 points
Homework Total	1600 points

In-Class Quizzes**8%**

Quizzes Total	800 points
---------------	------------

Attendance**8%**

Attendance Total	800 points
------------------	------------

TOTAL OF POINTS	10000 points
------------------------	---------------------

Grading Scale

100-90	A
80-89	B
70-79	C
60-69	D
00-59	F

Exams

Remove all hats through the duration of a quiz or an exam. Bring a ruler and a #2 pencil as directed to quizzes/exams. You must bring a blue 8.5*11 scantron form # 4252-ES to each exam if instructed to do so. Make up exams *may* be permitted under exceptional circumstances and *must* be arranged prior to the exam unless it is a medical emergency (personal or close family). For any absence to be excused, students must present appropriate documentation (signed note from physician on physician's letterhead, or similar official document, depending on circumstances.)

Quizzes

There will be unannounced quizzes throughout the semester. Unless you have or are absent for a family emergency or sanctioned UA event, there will be no make-ups for quizzes. If you miss a quiz for an excusable reason, you will be required to provide appropriate documentation for that reason (a written doctor's excuse, documentation of the nature of the family emergency, or an official letter on UA letterhead from the organizer of the UA-sanctioned event). We make no exceptions to this rule.

Homework

All homework must be submitted **prior to the beginning of class (by 11:30 am) on the date due.** Be sure to follow submission guidelines listed in the homework.

Attendance

Attendance for SUST 1103 is required. Attendance is crucial to understanding course content. Students who struggle in college are those who skip class.

Communication Requirements

All students must have an active UARK email account. As a class, we will be using this as our primary mode of communication. We check email routinely and expect that you would do the same. Please note that emails distributed to the class using the email list from ISIS SHOULD NOT be used to contact students, request class notes, sell or distribute spam email.

Classroom Expectations

So as to avoid any misunderstanding about what we expect from you in the classroom, let us **SPELL** them out for you. We expect you to be early or on time (**not 5 minutes late**). We need to hold one another accountable to this. Don't show up late. It's rude to the professors and to fellow students who have managed to get here on time. Turn off your phones, beepers, and any other electronic device that is deemed to be a distraction. While in the classroom, we expect your full attention and not have to share it with the person sitting next to you, the newspaper, or your friends on Facebook.

Recitation (Optional):

This semester, we are very fortunate to have 3 very capable graduate assistants for this course. These gentlemen will be available to assist students with homework assignments, answer questions related to class discussions, and generally assist you to earn the best possible grade for this course. We have reserved space at the UA Enhanced Learning Center (ELC) for 6 hours each week to accommodate student needs. The Enhanced Learning Center is located at the south basement entrance to Gregson Hall. All recitation sessions will meet in room 44 of the ELC. Recitations will be conducted Tuesdays, Wednesdays, and Thursdays from 2:00 – 4:00 p.m. Students who desire assistance with course homework assignments or who wish to clarify course content, develop better study habits, or generally learn more from this course are encouraged to attend one or more of these sessions weekly. Our experience is that those students who take advantage of these opportunities tend toward higher academic performance in the course. In addition to these recitation sessions, students are encouraged to visit faculty and graduate assistants during their regularly scheduled weekly office hours. You'd be surprised how much you can learn from short one-on-one conversations with mentors!

Weather and Religious Holidays

Even in inclement weather, our class may NOT be cancelled. Listen to what the university is planning to do, if they make no official announcement it is likely we will have class. You should expect that we would always have this class unless you hear from us differently (another reason to check/read your email). We will send an email to the class by 10:00am to let you know if there is some reason to operate against the above-mentioned policies. Please use your best judgment before getting on the road. **Students who live far from campus will have the opportunity to make up missed work. However, in order to receive full credit on homework, homework must be uploaded to blackboard by 11:30 am on the day it is due.**

Most Christian religious holidays are reflected in the organization of our academic calendar whereas holidays of other religious groups are not. If you need to be excused from class for religious reasons, you are expected to provide us a schedule of religious holidays that you intend to observe (and miss class) in writing during the first week of class.

Students Accommodation

If you want to request reasonable accommodations for this class due to a disability, you must first register with the Center for Educational Access (CAE) and hand-deliver an official Accommodation Letter from the CAE to the instructors during their office hours or after class. **If part of your accommodation includes a different setting for the exam please inform us one week before the exam that you would like this alternative location.** Time is needed to arrange for these locations.

Course Content Description

This semester, we look forward to sharing the exploration of sustainability with you. Below you will find a short summary of the types of information that will be disseminated during each section of this four-system based course.

Social Systems

Key concepts in understanding social-environmental linkages will be covered, including sociological imagination, globalization, the social construction of nature, framing, stratification, socio-environment paradigms, and theories of social change and social movements. These concepts provide the framework for understanding how social behaviors and dynamics lead to the global environmental crisis. *Theories of social justice and equity are reviewed* to provide an understanding of the relationship between social inequality (resource allocation) and (un)sustainability. The uneven distribution of resources impacts certain subgroups more than others; particular attention will be paid to discussing the effects of unequal resource distribution on the poor, indigenous, racial/ethnic minorities, women, and the place-bound in both urban and rural areas.

Natural Systems

Provides a modern contextual view of Earth as a closed system with respect to matter and development of concepts of material transfers among various components of the Earth System (atmosphere, hydrosphere, geosphere, biosphere). Emphasis is on developing fundamental understanding of linkages among various Earth processes and principles of sustainability. Introduction to population concepts, exponential functions, and the importance of quantitative measures to document environmental change as well as progress toward or retreat from sustainability will be provided. Interconnectedness of Earth processes and implications of interactions among Earth systems will also be discussed as they relate to the Grand Challenge of sustainability.

Built Systems

Focuses on the adverse effect that design and construction of buildings, with related infrastructure, have on the preservation of natural resources and quality of the environment. In this part of the course, we address the sustainable theories and concepts in the context of the built world, with the promise that they hold in shaping a better environment, and in changing our views on human-nature relations. Three broad topics will be addressed in the following sequence: regional planning and land use considerations, site-landscape planning, and sustainable design principles for the production of buildings.

Managed Systems

Addresses foundations of life cycle analysis, agricultural production-distribution mechanisms, consumer good production, business, and policy. The evolution of agricultural systems and the foundations of agricultural practices for meeting sustainability objectives will be examined. Business foundations for sustainability will be covered, including ethics, life cycle assessment and the optimization of sustainability objectives throughout the supply chain.

WEEK	DAY	DAY of Month	LECTURE	HMWK	READING
			SOCIAL SYSTEMS		
W-1	W	18-Jan	Introduction/Housekeeping/Approach/Syllabus/Blackboard – What is Sustainability? Looking Through System Lens		oWorld Commission on Environment and Development, 1987, Chairman's Foreward; http://www.un-documents.net/wced-ocf.htm oWorld Commission on Environment and Development, 1987, Our Common Future, From One Earth to One World; http://www.un-documents.net/ocf-ov.htm http://myfootprint.org/en/ ; http://www.sustainablescale.org/conceptualframework/understandingscale/measuringscale/ecologicalfootprint.aspx
	F	20-Jan	The Social Construction of Nature - Our Ecological Footprint	HMWK 1 ASSIGNED	http://e360.yale.edu/feature/the_anthropocene_debate__marking_humanitys_impact/2274/ ; http://e360.yale.edu/feature/living_in_the_anthropocene_toward_a_new_global_ethos/2363/
W-2	M	23-Jan	3 BIG questions: what is to be sustained? For whom? Who decides?	HMWK 1 DUE	
	W	25-Jan	Fine Tuning Our Sociological Imagination; Sociological Theory and Concepts		Handout posted on Blackboard
	F	27-Jan	An Introduction to Environmental Sociology		Handout posted on Blackboard
W-3	M	30-Jan	Social Causes and Consequences of Environmental Degradation		http://e360.yale.edu/content/feature.msp?id=2198
	W	1-Feb	Race, class, health and environmental justice	HMWK 2 ASSIGNED	http://understandingkatrina.ssrc.org/Cutter/ ; http://understandingkatrina.ssrc.org/Bankoff/
	F	3-Feb	Resiliency, vulnerability, mitigation and adaption - societal responses		http://www.postcarbon.org/Reader/PCReader-Rees-Foundation.pdf
W-4	M	6-Feb	Guest speaker	HMWK 2 DUE	
	W	8-Feb	Social Change and Meeting the Challenge of a Sustainable World		http://www.dailymail.co.uk/femail/article-2072383/Eccentric-town-Todmorden-growing-ALL-
	F	10-Feb	Resiliency revisited; Review for Exam 1		

			NATURAL SYSTEMS		
W-5	M	13-Feb	Exam #1		
	W	15-Feb	Fundamental Tools of Sustainability Measurement: Scientific Notation and Dimensional Analysis		Hardin, G., 1968, The Tragedy of the Commons: Science, 13 December 1968: Vol. 162, no. 3859, pp. 1243 - 1248 (http://www.garretthardinsociety.org/articles/art_tragedy_of_the_commons.html) McConnell, R.L. and Abel, Basic Concepts and Tools: Using Math and Critical Thinking: Chapter 1, Environmental Issues, D.C., 2008, , An Introduction to Sustainability, 3rd edition, p1-17. Bartlett, A., 1998, Reflections on Sustainability, Population Growth, and the Environment, Renewable Resources Journal, Vol. 15, No. 4, Winter 1997 - 98, Pgs. 6 - 23 (http://www.albartlett.org/articles/art_reflections_part_1.html)
	F	17-Feb	Estimation, Order-of-Magnitude, Scaling in Natural Systems	HMWK 3 ASSIGNED	McConnell, R.L. and Abel, D.C., 2008, Cont.

W-6	M	20-Feb	Arithmetic of Growth: Basics		Bartlett, A., 1993, The Arithmetic of Growth: Methods of Calculation: Population and Environment, v.14, no.4, p.359-386. (http://www.albartlett.org/articles/ee_arithmetic_of_growth_calculation_1.pdf)
	W	22-Feb	Arithmetic of Growth: Understanding Exponential Growth	HMWK 3 DUE	Bartlett, A., 1993, The Arithmetic of Growth: Methods of Calculation: Population and Environment, v.14, no.4, p.359-386. (http://www.albartlett.org/articles/ee_arithmetic_of_growth_calculation_1.pdf)
	F	24-Feb	Arithmetic of Growth: Doubling Time		Bartlett, A., 1993, The Arithmetic of Growth: Methods of Calculation, II: Population and Environment, v.20, no.3, p.215-246. (http://www.albartlett.org/articles/ee_arithmetic_of_growth_calculation_2.pdf)

W-7	M	27-Feb	Examples of Exponential Growth		Bartlett, A., 1993, The Arithmetic of Growth: Methods of Calculation, II: Population and Environment, v.20, no.3, p.215-246. (http://www.albartlett.org/articles/ee_arithmetic_of_growth_calculation_2.pdf)
	W	29-Feb	Natural Resource Dynamics: Population vs. Consumption		Mata, F.J., Onisto, L.J., and J. , and Vallentyne, J.R., 1994. Consumption: The other side of population for development. Paper presented at International Conference on Population and Development. http://www.int-res.com/abstracts/esep/v12/n1/p15-20/
	F	2-Mar	Natural Resource Dynamics: The Demotechnic Index	HMWK4 ASSIGNED	Mata, F.J., Onisto, L.J., and J. , and Vallentyne, J.R., 1994. Consumption: The other side of population for development. Paper presented at International Conference on Population and Development. http://www.int-res.com/abstracts/esep/v12/n1/p15-20/

W-8	M	5-Mar	The Demotechnic Index of Nations		Mata, F.J., Onisto, L.J., and J. , and Vallentyne, J.R., 1994. Consumption: The other side of population for development. Paper presented at International Conference on Population and Development. http://www.int-res.com/abstracts/esep/v12/n1/p15-20/
	W	7-Mar	Review for Exam2: HOMEWORK DUE	HMWK 4 DUE	
	F	9-Mar	Exam #2		

			BUILT SYSTEMS		
W-9	M	12-Mar	Intro to Built Systems and their Synergy with the Three Other Domains, Sustainable Built Environment	HMWK 5 ASSIGNED	oUrbanity Revised by Bruce Mau http://0-web.ebscohost.com.library.uark.edu/ehost/pdfviewer/pdfviewer?vid=2&hid=108&sid=48f14f7e-3c51-4c9b-b078-f62be282f3dc%40sessionmgr113 oJohn Muir Letter http://www.sierraclub.org/john_muir_exhibit/john_muir_newsletter/john_muir_letter_to_s_hall_young_1910_may_31.aspx o Regenerative Design: Toward the Re-Integration of Human Systems with Nature (http://integrativedesign.net/images/Regenerative_ReIntegration.pdf) o Mazza, Ronald, Sustainable Design Has Changed Building Design, journal of green Buildings (http://www.rjc.ca/sites/default/files/Archive_Sustainable%20Design_Mazza.pdf) o Long-term Sustainability of Sustainable Practice: From Green Fad to Green Facts (http://www.greenerfacilities.org/admin/data/white_papers/From_Green_Fads_to_Green_Facts.pdf) o Urban Tipping Point by Ray Tomalty http://0-web.ebscohost.com.library.uark.edu/ehost/detail?vid=2&hid=110&sid=74b4c7cf-ac59-4a98-b17c-b4902cb65d15%40sessionmgr111&bdata=JnNpdGU9ZWVhc3QtbGl2ZQ%3d%3d#db=a9h&AN=44530872
	W	14-Mar	Key Drivers for Sustainable Urban and Community Design Development		o Gregory D. Squires, Ed., Urban Sprawl and the Uneven Development of Metropolitan America, Chapter One: Urban Sprawl http://www.urban.org/books/urbansprawl/one.cfm o Richard T. T. Forman and Daniel Sperling, The Future of Roads: No Driving, No Emissions, Nature Reconnected, http://www.thesolutionsjournal.com/node/975 o The Congress for the New Urbanism: Sprawl Retrofit Initiative, The Unbearable Cost of Sprawl (http://www.cnu.org/sites/www.cnu.org/files/whitepaper-unbearablecostofsprawl.pdf) o Urban Sprawl: Pros and Cons, (http://www.perc.org/pdf/feb99.pdf) o Causes of Urban Sprawl in the US, Robert Wassmer and David Edwards, http://www.docstoc.com/docs/53235007/Causes-of-Urban-Sprawl-(Decentralization)-in-the-United-States o Building Better, (http://www.sierraclub.org/sprawl/report05/buildingbetter.pdf) o Paul Zyckofsky, Building Livable Communities with Transit http://www.lgc.org/freepub/community_design/articles/build_with_transit/index.html o Ahwanhee Principles, Peter Calthorpe et al. http://www.lgc.org/ahwahnee/principles.html

	F	16-Mar	Place based Energy, Natural Resources and Materials Utilization, Environmental Quality in Built Structures		o Build America Best Practices Series: Volume 4 http://www.nrel.gov/docs/fy05osti/38448.pdf o Toward Hillary Brown, AIA, Towards a Zero-Carbon Buildings http://www.postcarbon.org/report/185976-cities-towns-and-suburbs-toward-zero-carbon o Stephen L. Baird, Sustainable Design: The Next Industrial Revolution? http://0-web.ebscohost.com.library.uark.edu/ehost/pdfviewer/pdfviewer?vid=2&hid=108&sid=98fd162e-14e4-4cc2-8627-2c9fd09cbe1f%40sessionmgr104
--	---	--------	--	--	--

W-10		19-Mar	SPRING BREAK		
------	--	--------	---------------------	--	--

W-11	M	26-Mar	Landscape and Water - Lecture by Prof. Mark Boyer	HMWK 5 DUE HMWK 6 ASSIGNED	M. Bravcik, J. Pokorny, J. Kohvtiar, M. Kovac, E. Toth, Water for the Recovery of the Climate – A New Water Paradigm, Chapter 4 (available online at: http://www.vodnaparadigma.sk/)
	W	28-Mar	Definition of Sustainable Landscape/Landscape as a System/Comparison of Built Landscapes		
	F	30-Mar	Biodiversity, Human Health and Well-being		

W-12	M	2-Apr	Principles of Designing and Building Sustainably		o Build America Best Practices Series: Volume 4 http://www.nrel.gov/docs/fy05osti/38448.pdf pln1-des35 o Sustainable Design and Renewable Energy Concepts in Practice, Lawrence Maxwell, AIA http://0-web.ebscohost.com.library.uark.edu/ehost/pdfviewer/pdfviewer?vid=3&hid=111&sid=c8a62f24-d782-4b81-b7e2-1611e60fc056%40sessionmgr113 o Pell Frischmann, Sustainability Design Guidelines https://sites.google.com/a/pellfrischmann.com/sustainability/Home/sustainability-design-guidelines
	W	4-Apr	Case Studies of Built Environment and Discussion		o AIA/COTE Top Ten Green Projects http://www.aiatopten.org/
	F	6-Apr	Overarching review and assessment of sustainability content delivered throughout this course	HMWK 6 DUE	

			MANAGED SYSTEMS		
W-13	M	9-Apr	Exam #3		
	W	11-Apr	Foundations of a healthy agricultural system		Toward Sustainable Agriculture Systems in the 21st century. National Research Council.2010. Chapters 1 and 2 NRC Location http://www.nap.edu/catalog/12832.html
	F	13-Apr	Successes and challenges in feeding the world/ Approaches in solving problems	HMWK 7 ASSIGNED	NRC, Con't http://www.nap.edu/catalog/12832.html

W-14	M	16-Apr	Continuation of Approaches – One Size Does Not Fit All		NRC, Cont.
	W	18-Apr	The economics of sustainability (an introduction)	HMWK 7 DUE	Toward Sustainable Agriculture Systems in the 21st century. National Research Council. Chapter 3; Rees. W. 2001. Economics and Sustainability: Conflict or Convergence? Rees location http://www.environmentics.org/environmentics/econSustain.pdf
	F	20-Apr	The economics of sustainability (externalities)		Ikerd, 1997 Towards an Economics of Sustainability kert Location. http://web.missouri.edu/ikerdj/papers/econ-sus.htm

W-15	M	23-Apr	The economics of Sustainability	HMWK 8 ASSIGNED	Rees and Ikert con't
	W	25-Apr	Measuring Systems Sustainability - Life Cycle Analyses and Indices		EPA. LCA 101 EPA location http://www.epa.gov/nrmrl/lcaccess/lca101.html
	F	27-Apr	Measuring Systems Sustainability - Life Cycle Analyses and Indices		EPA con't

W-16	M	30-Apr	Environmental, Economic and Legal considerations of Ag. Systems, Typing the Managed Systems Together	HMWK 8 DUE	
	W	2-May	Final Class Review - Tying All Four Systems Together		
	F	4-May	DEAD DAY		

W-17	W	9-May	FINAL EXAM: MANAGED SYSTEMS		Exam takes place from 10:15-12:15 in our regular classroom.
------	---	-------	------------------------------------	--	---