AGRON 106X
Global Agriculture in a Changing World
Fall 2015 Syllabus

3 Credits

Meeting Time: MWF 2:10-3:00pm

Location: ELINGS 0308

Instructors: Assistant Professor Andy VanLoocke, Graduate Student Matthew Roby and Graduate Student Kaitlin Togliatti

Summary

Understanding climate and its effects on global distribution of food and water resources. The nature of climate and its variability in space and time. Use of satellites and related technology to monitor agricultural production, water availability and climate. Influence of climate and climate change on drought famine and other disruptions of essential resources.

Learning Outcomes

The following outcomes will be assessed with four forms of assessment.

1) Daily: In class "clicker" surveys
2) Weekly: In class quizzes and group activities graded only for completion
3) Weekly: Take home assignments on black board
4) Periodic: In class exams, two within semester, one comprehensive final

After completing AGRON 106X, Students will:

- be literate in climate as it relates to global agricultural resources[1]; and
- have begun developing a foundation of skills[2] needed to succeed in a university-level course at Iowa State University

1) We define literacy of climate and global agricultural resources as the ability to:

- appreciate the global context of agronomy
- discuss supply and demand for the food and fuel system including generalized population and social factors
- discuss the role of humans in the biosphere including the impacts of economics, social and political structures, and climate change
- define and apply the concepts of units, scales, fluxes, pools and feedbacks as it relates to climate and agriculture

- describe the dependence and interactions of agricultural production with the carbon, nitrogen and hydrological cycle
- recognize tradeoffs and drivers of patterns related to agronomy
- employ the concept of ecosystem services and the environment and the impacts of human decisions on their performance
- discuss the transfer of energy from producers to consumers
- articulate the ways in which agronomy fits within its social context
- describe basic interactions among weather and climate, soil, and plant production
- appreciate the magnitude of anthropogenic activities relative to earth system processes
- communicate in a meaningful way about the climate as a key component of the earth system and agricultural production systems
- critically asses the credibility of information about anthropogenic activity and climate

2) We identify the following skills as needed to succeed in a university-level course as:

- applying critical thinking to assess the credibility and applicability of information
- use the understanding of units and scales to use quantitative reasoning in an applied context
- apply the scientific method to obtain robust information
- identify and describe the nature and boundaries of a problem
- use prior knowledge to form a hypothesis, recognize dependent and independent variables
- find pertinent and reliable resources to answer simple questions
- accurately interpret information presented graphically
- use valid evidence to argue points
- recognize and address simple problems
- make predictions or recommendations based on simple case studies
- perform basic arithmetic and unit conversions
- write a complete paragraph
- share pertinent real world, real time information
- engage by contributing ideas in class (ask questions, offer thoughts, participate in discussions)
- be a co-creator of his/her education
- demonstrate the ability to work both independently and in cooperation with others
- use systems thinking to recognize patterns and constrain complex problems

Course Materials

Textbook: No required text book.

Classroom Response System or "Clicker"

We will use an electronic polling system (commonly called a "clicker") for in-class feedback. You will need to purchase a TurningPoint RF "clicker" from the bookstore. This system will be in use at Iowa State for the duration of your college career. If your current and future instructors

also choose to use a classroom response system, they will use this same technology and you will be able to use this same clicker in these classes.

Policies

Assignments are submitted electronically on **Blackboard Learn**. Exams are multiple choice, fill in the blank and a few short essay questions.

Late or missed work: We understand that emergencies happen and can lead to late or missed assignments and/or exams. We will not accept late assignments, and we will not schedule individual makeup exams. Instead we have the following policies:

Assignments: There will be 12 assignments during the semester. The lowest 2 scores, will be dropped. Assignments will go out on the last day of class of a given week, and will be due one week later **BEFORE** the start of class.

Exams: There will be 2 exams and a comprehensive final exam covering the material on exams 1 and 2 as well as material from the third section. If you miss an exam or simply do better on the final exam, you will be permitted to do 1 substitution of your final exam score for the section covering exam 1 or exam 2 material. For example if:

Exam 1 = 95%, Exam 2 = 0% and Final Exam (part1, part 2, part 3) = 92%, 88%, 93% then your exam grade will be as follows: Exam 1 = 95%, Exam 2 =88% and Final Exam = 91%

The Final Exam is required for everyone and cannot be made up.

This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook

University/College/Program requirements satisfied

- University - International Perspectives
- LAS college - Natural Science
- GLOBE Program – Life and Physical Sciences

Grading

There are a total of 1000 possible points in the class. Points are broken down as follows:

- In Class Exams: 250 Points (2 exams, 125 points each)
- Final Exam: 250 Points (required for all students)
- Assignments: 400 Points (12 assignments, top 10 counted, 40 points each)
- Participation: 100 Points (50 points for clicker, 50 points for in class activities)
- Bonus: 50 Points (for Twitter participation or in-class engagement)

Note: I do not intend to curve and grades. However, the instructor reserves the right to curve grades in any of the above mentioned sections as deemed fit in their judgment at any point during the semester, and students will be notified.

Grade Scale

Grade	Max pts.	Min pts.
A	1000	920
A-	919	900
B+	899	860
B	859	830
B-	829	800
C+	799	760
C	759	730
C-	729	700
D+	699	660
D	659	630
D-	629	550
F	549	0

What I expect of you

I expect that you will **learn**, **have fun,** and be **intellectually stimulated** in class. I expect that you will be an **engaged** and **respectful** participant in class that you arrive to class **on time** and **prepared** to learn. I expect you to **ask questions** when I am not being clear, you are confused, or otherwise curious about a topic. You are responsible for checking the syllabus and announcements on black board for assignment due dates and updates.

What you should expect from me

You can expect me to be dedicated to creating a **learning environment** that is **fun** but **serious** and **intellectually stimulating.** I will treat you with **respect** and hopefully **challenge** you to become an even more informed member of society**.** You can expect me to show up **on time** and **prepared** for class and to provide **timely feedback**, within a realistic set of expectations. You can expect me to try to be **engaging** and **motivating** and to do so by **asking you questions**.

Communication with Instructors

Email: agron106prof@gmail.com (Best method)

Important: All course-related email must be sent to the address listed above (not iastate accounts) and you **MUST** include your last name and a topic in your subject line.

For example: VanLoocke: Question on Homework 1.

Twitter: @ISUAgron106

The Agron106 twitter account will be linked to the course blackboard page. Students can share **non-personal, appropriate** and **relevant** news and science information with the course. Inappropriate use of twitter will result in account blockage and ineligibility to receive bonus points.

Office visit: Dr. VanLoocke: 3027 Agronomy, office hours 3-4 pm M,W

TAs : 3303 Agronomy, office hours 2-3 pm T,R

Phone: 515-294-8398

Per ISU privacy policies, all questions regarding grades must be made in person. We cannot discuss grades over phone or email.

Academic Dishonesty

The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the Dean of Students Office.
http://www.dso.iastate.edu/ja/academic/misconduct.html

Disability Accommodation

Iowa State University complies with the Americans with Disabilities Act and Sect 504 of the Rehabilitation Act. If you have a disability and anticipate needing accommodations in this course, please contact (instructor name) to set up a meeting within the first two weeks of the semester or as soon as you become aware of your need. Before meeting with (instructor name), you will need to obtain a SAAR form with recommendations for accommodations from the Disability Resources Office, located in Room 1076 on the main floor of the Student Services Building. Their telephone number is 515-294-7220 or email disabilityresources@iastate.edu . Retroactive requests for accommodations will not be honored.

Dead Week

This class follows the Iowa State University Dead Week policy as noted in section 10.6.4 of the Faculty Handbook http://www.provost.iastate.edu/resources/faculty-handbook .

Harassment and Discrimination

Iowa State University strives to maintain our campus as a place of work and study for faculty, staff, and students that is free of all forms of prohibited discrimination and harassment based upon race, ethnicity, sex (including sexual assault), pregnancy, color, religion, national origin, physical or mental disability, age, marital status, sexual orientation, gender identity, genetic information, or status as a U.S. veteran. Any student who has concerns about such behavior should contact his/her instructor, Student Assistance at 515-294-1020 or email dso-sas@iastate.edu, or the Office of Equal Opportunity and Compliance at 515-294-7612.

Religious Accommodation

If an academic or work requirement conflicts with your religious practices and/or observances, you may request reasonable accommodations. Your request must be in writing, and your instructor or supervisor will review the request. You or your instructor may also seek assistance from the Dean of Students Office or the Office of Equal Opportunity and Compliance.

Contact Information

If you are experiencing, or have experienced, a problem with any of the above issues, email academicissues@iastate.edu.

Week	Topic(s) SUBJECT TO CHANGE
	Section 1: The Global Context of Agronomic Science
1 8/24 to 8/28	<u>Introduction: Food, energy and Environment "Trilemma"</u> - Broad overview on the context of the course and presentation of the Modern Agronomic Mandate - Physical Science 101: The scientific method, scientific notation, scales, systems, feedbacks, units Assignment 1: Due (9/4)
2 8/31 to 9/4	<u>Global Climate Patterns</u> - Climate vs Weather - The distribution of climate classifications and their properties Assignment 2: Due (9/11)
3 9/7 to 9/11	<u>Global Soil Patterns</u> no class Mon 9/7 - The distribution of soil types, textures and their composition and physical properties - Soil erosion and degradation Assignment 3 Due (9/18)
4 9/14 to 9/18	<u>Global Agricultural Production</u> - Distribution of total production by crop type: Trends and technology - Geographic distribution of agricultural production - Defining and identifying "yield gaps" - Water in agriculture Assignment 4 Due (9/25)
5 9/21 to 9/25	<u>Global Agricultural Consumption</u> - Where and how is food distributed and consumed today? - Population & economic growth and the impacts nutrition and diets No Assignment: Prepare for Exam 1

Week	**Section 2: The Physical Context of Agronomic Science.**
6 9/28 to 10/2	<u>Introduction to the Atmosphere Part 1</u> - Atmospheric composition and structure - Atmospheric processes: Radiation and heat Exam 1 on 9/28 Assignment 5: Due (10/9)
7 10/5 to 10/9	<u>Introduction to the Atmosphere Part 2</u> - Greenhouse Effect: Greenhouse Gases - Atmospheric processes: Water, phase changes and precipitation - Atmospheric processes: orographic rain shadow Assignment 6: Due (10/16)
8 10/12 to 10/16	<u>Introduction to the Biosphere Part 1</u> - Atmospheric processes: Wind and circulations - Hydrologic cycle Assignment 7: Due (10/23)
9 10/19 to 10/23	<u>Introduction to the Biosphere Part 2</u> - Nitrogen cycle and water quality - Carbon cycle Assignment 8: Due (10/30)
10 10/26 to 10/30	<u>Atmosphere-Biosphere Interactions</u> - Photosynthesis No Assignment: Prepare for Exam 2

Week	**Section3: Human Decisions in the Context of Global Agronomy**
11 11/2 to 11/6	<u>Global Climate Change Part 1</u> - The history of earth's climate: Defining "Natural Variability" - Recent trends in the global climate: Examining human induced climate change Exam 2 on 11/2 Assignment 9: Due on (11/13)
12 11/9 to 11/13	<u>Global Climate Change Part 2</u> - Greenhouse gas emissions: Current rates and future projections - The future of global climate: Focus on major agricultural production regions Assignment 10: Due on (11/20)
13 11/16 to 11/20	<u>Impacts of Global Change on Agriculture Part 1</u> - Crop phenology and management under climate change - Responses to increasing temperature - Land use change and feedbacks between the biosphere and the atmosphere (Matt Guest Lecture) Assignment 11: Due on (12/4) Thanksgiving break (11/23 to 11/27)
14 11/30 to 12/4	<u>Impacts of Global Change on Agriculture Part 2</u> - Responses to increasing O_3 and drought - Combined Responses to increasing temperature and CO_2 - The impacts of recent climate change on agriculture - Projections of future agricultural production Assignment 12: Due on (12/11)
15 12/7 to 12/11	<u>A path forward: Adaptation, Mitigation, Solutions and Opportunities</u> - Food vs. Fuel: Global energy requirements and agriculture today. - Population & economic growth and the impacts on renewable bioenergy - Climate change mitigation strategies: Geoengineering, biofuels and other renewables - Agricultural and social adaptation strategies: The role of technology and policy. No Assignment: Prepare for **Final Exam – 12/14 – 12:00-2:00pm**