NCLC 395 - 002 Beekeeping & Sustainability
Wednesdays 10:30am – 1:10pm
Meeting Room: Planetary Hall Room 126

Instructor: German Perilla
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Open Office Hours Wednesdays from 2:00 to 4:00pm or appointment by request

Course Description
Students will explore the fascinating social structure, intense cooperation and organization, of honey bees as a natural phenomenon. Honey bees pollinated $12.4 billion worth of directly dependent crops and $6.8 billion worth of indirectly dependent crops in 2010 (Cornell University – Chronicle on Line) Bees in general, and honey bees in particular, are going through a time of crisis. There is a well-documented problem with honey bees called Colony Collapse Disorder (CCD). CCD is killing an unusual number of colonies per year, causing an additional crisis; the pollination industry in the United States is suffering the lack of bees to do their job. Due to the high colony mortality and high cost of hive maintenance, the beekeeping industry in the United States is a diminishing trade. This introductory beekeeping class has two main goals: The first is to expose students to sustainable beekeeping and the second is to propose beekeeping as a tool for sustainable development.

Learning Objectives
- Examine the history of beekeeping and its contemporary role in the global economy
- Analyze the biology and ethology of honey bees
- Understand the field of bee management
- Explore beekeeping as a tool for sustainable development.
- Develop a range of skills, tools and questions for analyzing various texts relating to beekeeping and sustainability.
- Demonstrate college-level oral and written communication skills.
- Apply skills that will facilitate collaborative learning.

New Century College Competencies Addressed:
Communication
Beekeeping is a fascinating topic in which students will become proficient in understanding the role of bees in nature, as well as the natural history and ethology of bees. During the course students will participate in class discussions and will make several presentations, where they will deliver an effective and coherent message to a variety of audiences.

Critical Thinking
The course will provide ample opportunities for students to become familiar with beekeeping industry problems and current sound solutions. Students will have several experiential learning opportunities to present solutions to local beekeeping challenges, such as how to improve existing equipment, or how to control bee pests more effectively or economically than current practices, etc.

Civil Engagement
Pollinators are essential not only for a healthy environment, but also to provide proper pollination for agricultural products, and to preserve nature as we know it. Students in the course will come to recognize the responsibility that each citizen has to keep our planet healthy. Each student in the class will become a voice to spread the message of social responsibility using beekeeping as a model of sustainable activity.

Required Texts

- **The Beekeeper's Bible – Stewart – Tabori – Chang, New York**
  Available at www.amazon.com
- **A Field Guide to Honey Bees an**d their Maladies
  Penn State Agricultural Science (to be provided)
- Primary (peer-reviewed) literature provided to students as required

Course Evaluation:

• Class Participation	10 Points
• Literature Review Presentation	5 Points
• Journal Front Line and Reflective	10 Points
• Experiential Learning Activities	30 Points
• Mid Term Exam	20 Points
• Case Study Proposal - Abstract	5 Points
• Group Presentation Final Project	10 Points
• Final Paper	10 Points
• Total	**100 Points**

Grading Scale

(A = 100 - 93) – (A- = 92-90) – (B+ = 89-86) – (B = 85-80) – (C = 79-70) – (D = 69 - 60) - (F = >60)

Class Participation - (10 points): Collaborative learning is an important feature of New Century College learning communities. Students are expected to attend class, to participate actively and responsibly, to hand in all assignments when due, and to support other students in the learning process. Each student will be an active learner, coming fully prepared to engage in that enterprise by raising questions and suggesting answers or tracks to follow in search of answers. Students are expected to read, and be prepared to discuss, the assigned texts. The instructor will evaluate students for individual contributions to classroom discussions.

Literature Review Presentation - (5 points): This activity involves working in groups of two or three. Each group will select related peer reviewed articles for analysis. With group members using the same general topic, although not necessarily with the same focus, each student will summarize the main points of the article and present the summary to the class for comment and discussion. Students will be graded on their individual presentation as well as the ability of the group to develop points of debate related to the article's topic(s). Each student is to formally site the article and the main points chosen for discussion in their journal.

For example: If a group selects a topic such as "beekeeping in Asia" and find articles describing foraging differences or competition between Apis mellifera vs. Apis cerana, then each student in the group will find one article within the topic to present to the class. The student summary of the article will either highlight points of view that support the viewpoints presented by other members in the group, or present and support opposite points of view. Such analysis is intended to prompt class discussion and interaction, as well as increase understanding and exposure to multiple scholarly viewpoints.

Student groups are to present their selected articles to the professor for approval at least one week before the scheduled presentation. An electronic copy of each article is to be made available for class members' review via the class DropBox. If articles are not placed in DropBox on time, 2 (two) points will be deducted from the student's score.

Note that a good place to search for articles related to class topics is The Mid-Atlantic Apiculture Research and Extension Consortium (MAAREC), http://agdev.anr.udel.edu/maarec/.

Journal - (10 points): The journal is a vital component of this course; it will have two components Front Line Entries and Reflective Entries.

- **Front-Line Journaling**: The entries for this journal are to be a detailed record of all factual information obtained during lectures and field activities and is should include plans and procedures to be executed during future bee managing activities. This journal will be collected and reviewed from time to time.
- **Reflective Journaling**: In these entries each student is asked to write their opinions, recommendations, possible solutions to a problem, disagreement with a topic, etc. Thoughts must be clearly stated and supported by evidence and logical reasoning.

Your journal is an important component to your success in this course and will be graded. Plan to spend a minimum of two hours per week on your journal.

Experiential Learning Activities - (30 Points): This is an experiential learning class. We will have several field activities over the course of the semester (please refer to the syllabus). Students will work in groups of two; each group will be responsible for the successful management of at least one bee hive. Field activities will include winter management, early spring management, swarm control techniques, colony reproduction, and colony preparation to obtain a good honey harvest; if time allows we will work in value-added products of the hive.

These hands-on beekeeping activities will take place in the GMU Fairfax campus apiary during regular class hours where best-practice beekeeping procedures will be modeled, procedures that you will use in the hive or hives that you are managing.

Please note that you must complete these experiential learning requirements in order to pass the class.

Some additional Field activities will take place on Saturdays, and the apiary locations for these extra activities may vary. Meeting times and specific details will be discussed during the first class period.

A course fee of one hundred dollars ($100.00) was included in the charge to your George Mason University student account when you registered for this course. These fees cover a portion of the costs associated with the equipment and bees for this course.

Midterm Exam - (20 points): Will cover all lectures to date and will be a one and a half hour multiple choice and short essay exam. Students can consult their journal during the exam.

Case Study Proposal - Abstract - (5 Points): Each student will compose a scientific abstract detailing your section of the group case study presentation. The final abstract will be 500 words in length (Times New Roman 12 point font double spaced, 1" margins) and will be accompanied by an adequate list of scholarly sources (at least 10). Note that you will submit an outline and annotated bibliography for your portion of the study before submitting the final abstract (see syllabus for due dates).

Group Presentation - Final Paper - (20 Points): Student groups will present the results of their case study to the class. Each presentation must include a background history and identification of the problem. The current state of affairs demonstrating the consequences of the problem and a conclusion presenting the possible solutions. Presentations will take place at the end of the semester and grades will be based upon peer-evaluations of the group's work. All students in the same group will receive the same grade (out of a maximum of 20 points) for the presentation.

Course Policies

Attendance and Preparation
Students are expected to attend every class session and to be prepared, meaning having completed the required readings and other assignments before class begins.

Late Work
Assignments are to be turned in at the beginning of class on the due date. For work turned in late but within 24 hours after it is due, scores will be reduced by 10%; by 20% if it is between 24 and 48 hours late. No work will be accepted without a valid written medical excuse if it is more than 48 hours late.

Makeup and Extra Credit
No makeup work will be given unless you have made prior arrangements with the instructor. Makeup requests for the Midterm and the Case Study Presentation will only be approved for students that present a doctor's note that states the students cannot or could not attend class, or if there is a documented death or grave injury in the student's immediate family.

A note on the Honor Code. George Mason University has an Honor Code, which requires all members of this community to maintain the highest standards of academic honesty and integrity. Cheating, plagiarism, lying, and stealing are all prohibited. Always cite your sources – if you do not, it is plagiarism. Plagiarism means lifting someone else's ideas or words and presenting them as your own without proper attribution of the source. This requirement is for all sources and resources, including Internet references. Use an approved citation method, "in text" APA is preferred.

The Office of Disability Resources
If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Resources at 703.993.2474. All academic accommodations must be arranged through that office.

Enrollment Statement
Students are responsible for verifying their enrollment in this class.
- Last Day to Add – January 27, 2015
- Last Day to Drop – February 20, 2015
- Selective Withdrawal Period – February 23 – March 27, 2015

After the last day of the Selective Withdrawal Period, withdrawing from this class requires the approval of the dean and is only allowed for nonacademic reasons.

NEW CENTURY COLLEGE COMPETENCIES

COMMUNICATION

Communication is the process of creating and sharing meaning through human interaction. A competent communicator will be able to:

- Speak, read, write and listen effectively, with attention to audience, purpose and context.
- Use appropriate language, nonverbal and visual symbols.
- Organize ideas and information strategically.
- Design, revise and produce work tailored to diverse audiences.

CRITICAL THINKING

Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating a judgment or conclusion. Someone who is a good critical thinker will be able to:

- Explore the issues and identify any problems to be solved.
- Identify and evaluate relevant, valid information and evidence.
- Understand the influence of context and assumptions.
- Summarize and synthesize key issues.
- Articulate his or her own position using evidence-based arguments.
- Design and implement problem solving plans.

GROUP COLLABORATION

Group collaboration is the process of working toward a shared agenda and/or common purpose while capitalizing on the diversity within the group. Effective group collaboration means that students should be able to:

- Create shared expectations and a common purpose.
- Understand and choose roles and tasks.
- Make decisions and track progress collaboratively.
- Facilitate constructive consensus-building, compromise and conflict.
- Integrate individual talents and strengths toward the accomplishment of goals and tasks.
- Be inclusive and value the diversity of the group.

GLOBAL UNDERSTANDING

Global Understanding is the respect for and appreciation of the interconnections among biocultural systems. Global understanding includes the ability to:

- Appreciate and apply diverse perspectives, ways of knowing, and values.
- Analyze the complexity of the interconnectedness of local and global communities politically, economically, socially, and culturally.
- Understand and respect various life forms and the environment.
- Recognize and address the global implications of human, environmental, and economic exploitation.

CIVIC ENGAGEMENT

Civic engagement is practice based on an informed understanding of communities and the roles and responsibilities of individuals within those communities. Students will:

- Develop the ability to examine contemporary issues and their historical contexts.
- Recognize and value multiple perspectives in civic life.
- Understand how actions are shaped by multiple forces, including values, and economic and social inequity.
- Make informed choices regarding personal community involvement, social justice issues and leadership roles.
- Work collaboratively with diverse partners to solve problems for a common good

DIGITAL LITERACY

As information and communication technologies permeate more and more aspects of personal, professional and civic life, students need to be able to apply and critique existing and emerging technologies. Competence in digital literacy requires that students will be able to:

- Research, evaluate and apply the digital information and communication tools and platforms appropriate to each activity undertaken.
- Demonstrate a readiness to learn new information communication technology (ICT) confidently and independently in the creation of original digital work.
- Integrate existing personal and networked ICTs with emerging tools and platforms.
- Understand and ethically resolve the privacy, security, accessibility and identity-management issues associated with the integration of digital literacy into everyday life.

AESTHETIC AWARENESS

Aesthetic awareness encourages individual to develop intellectual and emotional responses to nature or human creativity. An aesthetically aware person can:

- Understand the historical, social, political, environmental or gendered contexts of specific created works.
- Appreciate the complex processes of creative expression in multiple forms and media.
- Recognize and explore the transformative potential of creativity in effecting societal change.
- Value creative expression and the natural world to enrich everyday life.

WELL-BEING

Well-being is the life-long experience of life satisfaction and purpose. Students will:

- Develop insights and habits of regularly assessing one's own quality of life.
- Develop self-efficacy and control over one's own life.
- Effectively self-manage stress and anxiety.
- Find equanimity and resiliency in the face of adversity.
- Develop imaginative and inclusive ways to solve problems.
- Create and sustain positive relationships and social support.
- Demonstrate pro-social behaviors and emotions (e.g., compassion, gratitude, cooperation).

Weekly Schedule

Class 1 - January 21 – Introduction to Beekeeping

- History of beekeeping from ancient to current days
- Reading: **The Beekeeper's Bible p 12-63**

Class 2 - January 28 - Bees and beekeeping in the world (G1 – 2 students)

Guest Speaker: Environmental Justice - Tom Carter Attorney

- Bees of the world
- Economic importance of beekeeping
- Reading: **The Beekeeper's Bible 64-93**

Class 3 - February 4 – Apis mellifera (G2 – 2 students)

- Anatomy
- Physiology
- Reading: **The Hive and the Honey Bee Chapters 4, p:103-169**
- Reading: **The Anatomy of the Honey Bee RE Snodgrass** (Provided)

Class 4 - February 11 – Apis mellifera Biology of a Super organism (G3 – 3 students)

Guest speaker: Pollination - Organic Food Production – Sam Quinn, Sunnyside Farms

- The colony
- Feral vs. Managed
- Bee ethology
- Mammal Characteristics of the honey bee
- Honey bee strategies for success
- Bee diet
- Bee intelligence
- Bee society
- Reading: **The Beekeeper's Bible 94-118**
- Reading: **The Honey Bee Dance Language (provided)**
- Reading: **The honey Bee as a Super Organism Thomas Seeley (provided paper)**

Class 5 – February 18 – Pollinators and Pollination (G4 – 3 students)

Guest Speaker: Pollination – VA Apple Crop Pollination – Glaize Apple Orchards

- The Beekeeping Year
- Flowers and bees
- Flowers and other pollinators
- Film on pollination **"Wings of Life"**
- Reading: **The Beekeeper's Bible 119-122, 131-143**
- Reading: **Bee Pollination hand Book McGregor (provided)**

Class 6 - February 25 – How to set an apiary (Paper outline and references due) (G5 - 3 students)

Guest Speaker: Hive remote monitoring – Frank Linton, Master Beekeeper and author

- Apiary distribution
- Apiary location
- Record Keeping
- Finding Bees
- Reading: The Beekeeper's Bible 154-235

March 4 – Midterm - NO CLASS

March 9- 15 Spring Break

Class 7 - March 18 – Bee Health and reproduction (Abstract due) (G6 - 3 students)
Guest Speaker: Beekeeping Resources - Ms. Louise Edsall, Sweet Virginia Education Specialist

- Healthy Bees
- Honey bee diseases
- Reading:
- Reading: **A Field Guide to Honey Bees and Their Maladies**
- Reading: **The Beekeeper's Bible 236-246**

Class 8 - March 25 – Hive Products
Guest Speaker: Remote Sensing Techniques - Dr. Siddiq Kalaly

- Honey
- Pollen
- Wax
- Propolis
- Royal Jelly
- Bee Venom
- Community Driven Development
- Honey tasting
- Reading: **Value Added Products (provided)**
- **Reading: The Beekeeper's Bible 247 - 396**

Class 9 - April 1 – Introduction to Bee Management Field I

Class 10 - April 8 - Introduction to Bee Management Field II

Class 11 - April 15 - Introduction to Bee Management Field III

Class 12 - April 22 - Introduction to Bee Management Field VI

Class 13 – April 29 - Group Presentations

- Three Groups

Class 14 - May 6 - Group Presentations

- Three Groups
- Final Paper Due
- Journal Due