AGRICULTURAL FACULTY MEETING

Tuesday, November 8, 2016
3:30 p.m.
Deans of Agriculture Auditorium, Pfendler Hall

1. Call to Order - Dean Jay Akridge
2. Approval of Agenda
3. Announcement of College of Agriculture Faculty Awards – Dennis Buckmaster
4. Consent Agenda – Action Items
   - Approval of Minutes of April 7, 2016 Agricultural Faculty Meeting
   - Document I – Agricultural and Biological Engineering
   - Document II – Agriculture
   - Document III – Agronomy
   - Document IV – Biochemistry
   - Document V – Entomology
   - Document VI – Forestry and Natural Resources
   - Document VII – Horticulture and Landscape Architecture
   - Document VIII – Natural Resources and Environmental Science
   - Document IX – Youth Development and Agricultural
   - Document X – Curriculum and Student Relations Committee
   - Approval of 2016 December Degree Candidates
5. Memorial Resolutions
6. Report Items
   - University Senate Report – Ryan Cabot
   - Dean’s Comments – Jay Akridge
7. Other Business
A. COURSES TO BE DELETED

None

B. COURSES TO BE ADDED

None

C. COURSES TO BE CHANGED

From:

ASM 42100 Senior Seminar    Sem. 1 Lec. 1 Cr. 1

Professional attitudes and ethics, resume preparation and interview procedures, business correspondence, meetings, and career planning.

Restrictions:
Major: Agricultural Systems Mgt.
Classifications: Senior 105+ hours, Senior 90-104 hours

Prerequisites:
ASM 22100

To:

ASM 42100 Senior Seminar    Sem. 1 Lec. 1 Cr. 1

Professional attitudes and ethics, resume preparation and interview procedures, business correspondence, meetings, and career planning.

Restrictions:
Major: Agricultural Systems Mgt.
Classifications: Senior 105+ hours, Senior 90-104 hours, Junior 75-89 hours

Prerequisites:
ASM 22100

Justification: Course classification restriction updated to reduce need for overrides. Students sign up for this course during their 6th semester, but many have not earned 90 or more hours before this point. Impact on Learning Outcomes: Learning outcomes do not need to be addressed since the course content is not being changed.
ASM 49400 Project Planning and Management  Sem. 1 Lec. 1 Cr. 1
Discussion of topics relevant to project planning and execution in industry, including technical communication, budgeting, team management, intellectual property, and timelines. Student teams will develop project proposal to address contemporary issues in agricultural systems management.

Restrictions:
Major: Agricultural Systems Mgt.
Classifications: Senior 105+ hours, Senior 90-104 hours

Prerequisites:
ASM 22100

To:

ASM 49400 Project Planning and Management  Sem. 1 Lec. 1 Cr. 1
Discussion of topics relevant to project planning and execution in industry, including technical communication, budgeting, team management, intellectual property, and timelines. Student teams will develop project proposal to address contemporary issues in agricultural systems management.

Restrictions:
Major: Agricultural Systems Mgt.
Classifications: Senior 105+ hours, Senior 90-104 hours, Junior 75-89 hours

Prerequisites:
ASM 22100

Justification: Course classification restriction updated to reduce need for overrides. Students sign up for this course during their 6th semester, but many have not earned 90 or more hours before this point.

Impact on Learning Outcomes: Learning outcomes do not need to be addressed since the course content is not being changed

D. CURRICULAR CHANGES

None
Agriculture (AGR)
Proposed Course and Curricular Changes

A. COURSES TO BE DELETED

None

B. COURSES TO BE ADDED

None

C. COURSES TO BE CHANGED

None

D. CURRICULAR CHANGES

Interdisciplinary Agriculture – Major

1. Revisions to the First Year composition requirement
2. Addition of MA 15800
3. Increase electives by 0-1
## Interdisciplinary Agriculture

120 Credits

### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0.5) AGR 10100 (Introduction to the College of Agriculture and Purdue University)</td>
<td>(4) BIOL 11100 (Fundamentals of Biology II)</td>
</tr>
<tr>
<td>(0.5) AGR 1XXXX (Introduction to Departmental Academic Programs)</td>
<td>(3) CHM 11200 (General Chemistry)</td>
</tr>
<tr>
<td>(4) BIOL 11000 (Fundamentals of Biology I)</td>
<td>(3) MA 15800 (PreCalculus) or MA 16010 (Applied Calculus I)</td>
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<tr>
<td>(3) CHM 11100 (General Chemistry)</td>
<td>(3) Agricultural selective</td>
</tr>
<tr>
<td>(3-4) First-Year Composition Selective</td>
<td>(3) Elective</td>
</tr>
<tr>
<td>(14-15)</td>
<td>(16)</td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>Third Semester</th>
<th>Fourth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) AGEC 21700 (Economics)</td>
<td>(3) STAT 30100 (Elementary Statistical Methods)</td>
</tr>
<tr>
<td>(3) COM 11400 (Fundamentals of Speech Communication)</td>
<td>(6) Agricultural selectives</td>
</tr>
<tr>
<td>(3) Agricultural selective</td>
<td>(3) UCC Science, Technology and Society selective</td>
</tr>
<tr>
<td>(3) Mathematics or sciences selective</td>
<td>(3) Elective</td>
</tr>
<tr>
<td>(3) UCC Humanities selective</td>
<td>(15)</td>
</tr>
<tr>
<td>(15)</td>
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### Junior Year

<table>
<thead>
<tr>
<th>Fifth Semester</th>
<th>Sixth Semester</th>
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<tbody>
<tr>
<td>(3) Agricultural selective (30000+ level)</td>
<td>(6) Agricultural selectives (30000+ level)</td>
</tr>
<tr>
<td>(6) Mathematics or sciences selectives</td>
<td>(3) Humanities or Social science selective</td>
</tr>
<tr>
<td>(3) Humanities or Social science selective</td>
<td>(6) Electives</td>
</tr>
<tr>
<td>(3) Written or oral communication selective</td>
<td>(15)</td>
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<td>(15)</td>
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</table>

### Senior Year

<table>
<thead>
<tr>
<th>Seventh Semester</th>
<th>Eighth Semester</th>
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</thead>
<tbody>
<tr>
<td>(6) Agricultural selectives (30000+level)</td>
<td>(6) Agricultural selectives (30000+ level)</td>
</tr>
<tr>
<td>(9) Electives</td>
<td>(3) Humanities or Social science selective (30000+ level)</td>
</tr>
<tr>
<td>(15)</td>
<td>(5-6) Electives</td>
</tr>
<tr>
<td></td>
<td>(14-15)</td>
</tr>
</tbody>
</table>

#### CURRICULAR ADJUSTMENTS

**Additions:**
- MA 15800
- (0-1)Elective

**Modification:**
- (3-4) First-Year Composition Selective

*This major requires completion of a College of Agriculture academic minor unless an exception to allow a minor from another academic area is approved by the department that certifies completion of the Interdisciplinary Agriculture major.

**A minimum of 90 credits must be earned before being admitted to Interdisciplinary Agriculture.

***The major requires completion of a Capstone Course or Experience.*
<table>
<thead>
<tr>
<th>College of Agriculture Core</th>
<th>UCC Foundational Outcomes</th>
<th>Interdisciplinary Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Orientation - (1)</td>
<td></td>
<td>AGR 10100 and AGR 1XXX</td>
</tr>
<tr>
<td>Biological Sciences - (8)</td>
<td>Science</td>
<td>BIOL 11000 and (BIOL 11100 or BTNY 11000)</td>
</tr>
<tr>
<td>Calculus – (3)</td>
<td>Quantitative Reasoning</td>
<td>MA 15800</td>
</tr>
<tr>
<td>General Chemistry – (6)</td>
<td>Science</td>
<td>CHM 11100 and CHM 11200</td>
</tr>
<tr>
<td>Statistics – (3)</td>
<td>Information Literacy</td>
<td>ENGL 10600</td>
</tr>
<tr>
<td>Science, Technology, and Society - (1-3)</td>
<td>Sci., Tech., &amp; Society</td>
<td>UCC Selective</td>
</tr>
<tr>
<td>Additional Mathematics or Sciences - (3-5)</td>
<td></td>
<td>CoA Selective</td>
</tr>
<tr>
<td>First- Year Composition – (4)</td>
<td>Written Communication</td>
<td>ENGL 10600</td>
</tr>
<tr>
<td>Fundamentals of Speech Communication – (3)</td>
<td>Oral Communication</td>
<td>COM 11400</td>
</tr>
<tr>
<td>Additional Written and Oral Communication - (3)</td>
<td></td>
<td>CoA Selective</td>
</tr>
<tr>
<td>Economics – (3)</td>
<td>Social Science</td>
<td>AGEC 20300, AGEC 20400 AGEC 21700, ECON 21000, ECON 25100 or ECON 25200</td>
</tr>
<tr>
<td>Humanities – (3) CR</td>
<td>Humanities</td>
<td>UCC Selective</td>
</tr>
<tr>
<td>Social Sciences or Humanities – (9)</td>
<td></td>
<td>CoA Selective</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Embedded Outcomes</th>
<th>Interdisciplinary Agriculture Curriculum Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Thinking</td>
<td>Capstone Course</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>Capstone Course</td>
</tr>
<tr>
<td>Ethical Reasoning</td>
<td>Capstone Course</td>
</tr>
<tr>
<td>Global Citizenship and Awareness</td>
<td>CoA International Understanding Selective</td>
</tr>
<tr>
<td>Intercultural Knowledge</td>
<td>CoA Multicultural Awareness Selective</td>
</tr>
<tr>
<td>Leadership and Teamwork</td>
<td>Student Organization Participation</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>STAT 30100</td>
</tr>
<tr>
<td>Integrative Knowledge</td>
<td>Capstone Course</td>
</tr>
<tr>
<td>Written Communication (Levels 2 and 3)</td>
<td>CoA 20000+ Level Written Communication Selective</td>
</tr>
<tr>
<td>Information Literacy (Levels 2 and 3)</td>
<td>STAT 30100</td>
</tr>
<tr>
<td>Oral Communication (Level 2 and 3)</td>
<td>CoA 20000+ Level COM Selective</td>
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</table>

<table>
<thead>
<tr>
<th>Statewide General Transfer Core</th>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Human Cultures (Humanities/Artistic)</td>
<td>UCC Humanities Selective</td>
<td>3</td>
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<tr>
<td>Human Cultures (Social Sciences)</td>
<td>AGEC 20300, AGEC 21700, ECON 25100</td>
<td>3</td>
</tr>
<tr>
<td>Science Selective</td>
<td>CHM 11100 and CHM 11200</td>
<td>6</td>
</tr>
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<td>Science Selective</td>
<td>BIOL 11000 and (BIOL 11100 or BTNY 11000)</td>
<td>8</td>
</tr>
<tr>
<td>Written Communications</td>
<td>ENGL 10600</td>
<td>4</td>
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<tr>
<td>Oral Communications (Speaking/Listening)</td>
<td>COM 11400</td>
<td>3</td>
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<tr>
<td>Quantitative Reasoning</td>
<td>MA 15800</td>
<td>3</td>
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<td><strong>Total</strong></td>
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### Interdisciplinary Agriculture
https://ag.purdue.edu/oap/Pages/major.aspx

<table>
<thead>
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<th>Course number</th>
<th>Course Title</th>
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<tr>
<td>0.5</td>
<td>AGR 10100</td>
<td>Introduction to the College of Agriculture and Purdue University</td>
</tr>
<tr>
<td>0.5</td>
<td>AGR 1XXXX</td>
<td>Introduction to Departmental Academic Programs</td>
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#### Required Major Courses (1 credit)

<table>
<thead>
<tr>
<th>Credits</th>
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<tbody>
<tr>
<td>0.5</td>
<td>AGR 10100</td>
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<tr>
<td>0.5</td>
<td>AGR 1XXXX</td>
<td>Introduction to Departmental Academic Programs</td>
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</table>

#### Other Departmental /Program Course Requirements (92-93 credits)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course number</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>4</td>
<td>BIOL 11000</td>
<td>Fundamentals of Biology I</td>
</tr>
<tr>
<td>4</td>
<td>BIOL 11100</td>
<td>Fundamentals of Biology II</td>
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<td>3</td>
<td>CHM 11100</td>
<td>General Chemistry (satisfies Science #1 for core)</td>
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<td>3</td>
<td>CHM 11200</td>
<td>General Chemistry (satisfies Science #2 for core)</td>
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<td>3</td>
<td>MA 15800 or MA 16010</td>
<td>PreCalculus or Applied Calculus I (satisfies Quantitative Reasoning for core)</td>
</tr>
<tr>
<td>3</td>
<td>STAT 30100</td>
<td>Elementary Statistical Methods</td>
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<td>3</td>
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<td>Mathematics or Science Selective</td>
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First-Year Composition Selective (satisfies Written Communication for core) (satisfies Information Literacy for core)

<table>
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<th>Credits</th>
<th>Course number</th>
<th>Course Title</th>
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<tr>
<td>3</td>
<td>COM 11400</td>
<td>Fundamentals of Speech Communication (satisfies Oral Communication for core)</td>
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<td>3</td>
<td>Written or Oral Communication Selective</td>
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<tr>
<td>3</td>
<td>AGEC 21700</td>
<td>Economics</td>
</tr>
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<td>3</td>
<td>UCC Humanities Selective (satisfies Human Cultures Humanities for core)</td>
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<tr>
<td>3</td>
<td>UCC STS Selective (satisfies Science, Technology &amp; Society Selective for core)</td>
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<td>3</td>
<td>Humanities or Social Science Selective</td>
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<td>3</td>
<td>Humanities or Social Science Selective</td>
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<td>15</td>
<td>Agricultural Selective</td>
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<table>
<thead>
<tr>
<th>Credits</th>
<th>Elective</th>
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<tbody>
<tr>
<td>26-27</td>
<td>Elective</td>
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</tbody>
</table>

### University Core Requirements:

- **Human Cultures Humanities:** ____________  **Science, Technology, and Society:** ____________
- **Human Cultures Behavioral/Social Science:** ____________  **Written Communication:** ____________
- **Information Literacy:** ____________  **Oral Communication:** ____________
- **Science #1:** ____________  **Quantitative Reasoning:** ____________
- **Science #2:** ____________

### College of Agriculture & University Level Requirements:

- 2.0 GPA required for Bachelor of Science degree.
- 32 Upper division credits taken from Purdue.
- 9 credits International Understanding: ____________  ____________  ____________
- 3 credits Multicultural Awareness: ____________
- 9 credits of Hum and/or Social Sciences outside the College of Agriculture: ____________  ____________
Department of Agronomy
Proposed Course and Curricular Changes

A. COURSES TO BE DELETED

AGRY 29000 - Introduction to Environmental Science
Credit Hours: 3.00. Introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. For all students interested in an introductory natural resources or environmental science elective. Typically offered Fall Spring.

Rationale:
Course number will be changed to AGRY 12500.

B. COURSES TO BE ADDED

AGRY 12300 – Genetics and Society
Credit Hours: 3.00. Introduction to the broad impacts that genetics and genomics have on society, from medicine, genetic testing and DNA evidence to agriculture, genetically modified crops and synthetic life. Background information is provided on a weekly topic followed by extensive in-class discussion. Typically offered Fall. Prerequisites: None. An honors section will be made available.

AGRY 12500 – Environmental Science and Conservation
Credit Hours: 3.00. (NRES 12500, EAPS 12500, AGRY 12500) Introduction to environmental science and conservation includes topics in ecological principles, conservation and natural resource management, human impacts on the environment, toxic waste disposal, climate change, energy, air and water pollution, environmental geology, and geologic hazards. Typically offered Fall Spring Summer.

C. COURSES TO BE CHANGED

None

D. CURRICULAR CHANGES

None
Supporting Documentation

Semesters Offered: Fall

Schedule Type (Lecture/Lab): 3 hours Lecture/Discussion

Credits: 3

Course Title: Genetics and Society

A. Justification:

Genetics now permeates all aspects of biological sciences and, increasingly, much of where biology impacts society, from the food we eat to the environment we live in, our health and medicine. Agronomy 12300 is an introductory course intended to examine important issues that will face every member of society and that directly involve genetic principles and technologies. The barrage of conflicting and often incorrect information that consumers face about genetic approaches to medicine, food production, environmental conservation and many other topics now makes it more important than ever to have some insight into the underlying science. Rather than a comprehensive introduction to genetics, the course will focus on the aspects of genetics that allow students to understand and discuss the pros and cons of current scientific advances and arrive at their own informed conclusions. These topics will be covered as current case studies from the news and scientific literature and background genetic principles will be provided for each case study. The course is aimed at students from any discipline, particularly those outside the biological sciences. Students will be given materials to read, given a brief assessment to ensure they have completed the reading, assigned to small discussion groups and then engaged in a larger class discussion on each topic.

B. Outcomes:

i. Applicable to University Core Curriculum

This course ☒ will ☐ will not be nominated for inclusion on University Foundational Core. If no, skip to section ii.

<table>
<thead>
<tr>
<th>Foundational Learning Outcomes</th>
<th>Check all that apply</th>
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<tbody>
<tr>
<td>1. Written Communication</td>
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</tr>
<tr>
<td>2. Information Literacy</td>
<td>☒</td>
</tr>
<tr>
<td>3. Oral Communication</td>
<td>☐</td>
</tr>
<tr>
<td>4. Science</td>
<td>☐</td>
</tr>
<tr>
<td>5. Science, Technology and Society</td>
<td>☒</td>
</tr>
<tr>
<td>6. Mathematics/Quantitative Reasoning</td>
<td>☐</td>
</tr>
<tr>
<td>7. Human Cultures: Humanities</td>
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</tr>
<tr>
<td>8. Human Cultures: Behavioral &amp; Social Sciences</td>
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</tbody>
</table>
ii. Applicable to College of Agriculture Core

This course X will ☐ will not be nominated for inclusion on College of Agriculture Core. If no, skip to section iii.

<table>
<thead>
<tr>
<th>College of Agricultural Core</th>
<th>Check all that apply</th>
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</thead>
<tbody>
<tr>
<td>1. Mathematics and Sciences</td>
<td>☐</td>
</tr>
<tr>
<td>2. Written and Oral Communication</td>
<td>☐</td>
</tr>
<tr>
<td>3. Humanities and Social Sciences</td>
<td>X</td>
</tr>
<tr>
<td>4. Multicultural Awareness</td>
<td>☐</td>
</tr>
<tr>
<td>5. International Understanding</td>
<td>☐</td>
</tr>
<tr>
<td>6. Capstone</td>
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</table>

iii. Outcomes:

At the end of this course, students will be able to:
1. describe the issues, facts, and concepts central to a broad range of genetics and genomics topics,
2. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
3. describe work done in three scientific disciplines, biology, genetics and genomics, as well as some intersecting disciplines such as medicine and engineering

This course helps satisfy the following embedded outcomes:
1. Critical Thinking
2. Ethical Reasoning
3. Global Citizenship and Social Responsibility
4. Quantitative Reasoning

iv. Methods of evaluation or assessment:

<table>
<thead>
<tr>
<th>Methods of assessment</th>
<th>Check all that apply</th>
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</thead>
<tbody>
<tr>
<td>1. exams and quizzes</td>
<td>X</td>
</tr>
<tr>
<td>2. assessment and scoring of in class participation</td>
<td>X</td>
</tr>
<tr>
<td>3. assignments</td>
<td>X</td>
</tr>
<tr>
<td>4. class presentations</td>
<td>☒</td>
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<tr>
<td>5. Other (specify): Click here to enter text.</td>
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</table>
AGRY 12300

Genetics and Society - Fall 2017

Instructor: Dr. Clifford Weil  Phone: 496-1917
Office: 2349 Lilly  Office Hours: Tues. 11:00-12:00
Email: 6cweil@purdue.edu

TA: TBD  Phone: XXX
Office: XXX  Office Hours: TBD
Email: XXX@purdue.edu

When you have questions about the course, please send an email copied to both the instructor and the TA. The most reliable way to contact the instructor is e-mail. Please use the email addresses above to contact the instructors. Please note that replying to course list serve email does not get transmitted to the instructors.

Text and Learning Tools:

There is no textbook for this course; however, you will be making use of a wide variety of informational resources including the primary scientific literature, the internet, print and social media. There is a Blackboard site for this course. Reading materials, reading assessments, quiz/exam keys, announcements and grades will be posted there so it is crucial to check the website regularly.

YOU NEED AN i-CLICKER2 for this course. We will use them routinely in lecture and discussions and points will be associated with their use. If you have one from a previous class, it should work in this class as well. If you do not have one, they are available either through the bookstore or online. You are responsible for getting one, getting it registered (at http://www.iclicker.com/support/registervourclicker/--use your username for the “student ID”) bringing it to each class, maintaining it so that it functions every class (batteries, batteries, batteries!) and using it.

Course Overview/Description:

This course is offered to students interested in an introductory science or science, technology and society course. Genetics now permeates all aspects of biological sciences and, increasingly, much of where biology impacts society, from the food we eat to the environment we live in, our health and medicine. Agronomy 123 is an introductory course intended to examine important issues that will face every member of society and that directly involve genetic principles and technologies. The barrage of conflicting and often incorrect information that consumers face about genetic approaches to medicine, food production, environmental conservation and many other topics now makes it more important than ever to have some insight into the underlying science. Rather than a comprehensive introduction to genetics, the course will focus on the aspects of genetics that allow students to understand and discuss the pros and cons of current scientific advances and arrive at their own informed conclusions. A full list of topics is provided below. These topics will be covered as current case studies from the news and scientific literature and background genetic principles will be provided for each case study. The course is designed for students from any discipline, particularly those outside the biological sciences. For each weekly topic, you will be given materials to read, given a brief assessment to ensure you have completed the reading, assigned to small discussion groups and then engaged in a larger class discussion on each topic.

Learning Outcomes:

At the end of this course, students will be able to:

1. describe the issues, facts, and concepts central to a broad range of genetics and genomics topics,
2. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
3. describe work done in three scientific disciplines, biology, genetics and genomics, as well as some intersecting disciplines such as medicine and engineering
## Course Schedule

Lecture schedule: dates and topics are approximate. Exam dates are fixed.

<table>
<thead>
<tr>
<th>Date</th>
<th>Quiz/Exams</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 24</td>
<td></td>
<td><strong>Overview, Introduction: How Genes Work</strong></td>
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<tr>
<td>26</td>
<td></td>
<td>Discussion Groups</td>
</tr>
<tr>
<td>28</td>
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<td>Class Discussion</td>
</tr>
<tr>
<td>31</td>
<td>WEEK 2</td>
<td><strong>Genetic Variation</strong></td>
</tr>
<tr>
<td>Sept 2</td>
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<td>Discussion Groups</td>
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<tr>
<td>4</td>
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<td>Class Discussion</td>
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<tr>
<td>7</td>
<td>WEEK 3</td>
<td><strong>Labor Day</strong></td>
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<td>9</td>
<td></td>
<td><strong>Direct-to-consumer Genetic Testing</strong></td>
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<tr>
<td>11</td>
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<td>Discussion Groups and Class Discussion</td>
</tr>
<tr>
<td>14</td>
<td>WEEK 4</td>
<td><strong>Associating Genetic Variation with Traits and Diseases</strong></td>
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<tr>
<td>16</td>
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<td>Discussion Groups</td>
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<td>Class Discussion</td>
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<tr>
<td>21</td>
<td>WEEK 5</td>
<td><strong>Predictive Value of Genetic Testing?</strong></td>
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<tr>
<td>23</td>
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<tr>
<td>25</td>
<td></td>
<td><strong>EXAM #1</strong></td>
</tr>
<tr>
<td>28</td>
<td>WEEK 6</td>
<td><strong>Who gets to know your genotype?</strong></td>
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<tr>
<td>30</td>
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<td>Discussion Groups</td>
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<tr>
<td>Oct 2</td>
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<td>Class Discussion</td>
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<tr>
<td>5</td>
<td>WEEK 7</td>
<td><strong>Genetics and Cancer</strong></td>
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<td>12</td>
<td>WEEK 8</td>
<td><strong>October Break</strong></td>
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<tr>
<td>14</td>
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<td><strong>The Hot Zone; Viral outbreaks</strong></td>
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<td>16</td>
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<td>Discussion Groups and Class Discussion</td>
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<tr>
<td>19</td>
<td>WEEK 9</td>
<td><strong>Gene Therapy, Stem Cells</strong></td>
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<td>WEEK 10</td>
<td><strong>Epigenetics: What it is and why it matters</strong></td>
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<td>Nov 2</td>
<td>WEEK 11</td>
<td><strong>Personalized medicine: Hope or Hype?</strong></td>
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<td>WEEK 12</td>
<td><strong>DNA evidence in court</strong></td>
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<td>WEEK 13</td>
<td><strong>Genetically Engineering Humans</strong></td>
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<td>23</td>
<td>WEEK 14</td>
<td>More Class Discussion</td>
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<td>25</td>
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<td>Thanksgiving</td>
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<td>27</td>
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<td>WEEK 15</td>
<td><strong>Genetically Modified Crops</strong></td>
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<td><strong>The Genetic Economy and Synthetic Life</strong></td>
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<tr>
<td>TBD</td>
<td>Final Exam</td>
<td>Finals Week</td>
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TBD: To be determined.
Assignments and Grading:

Grading:

Reading and Assessments: 20 pts/assessment x 14 Weekly 280
Hourly Exams: 100 pts/exam X 2 exams In class 200
In-Class points Variable Day to day 280
Final Exam: 200 pts Finals Week 200
Total 960

Reading Assessments must be turned in to Blackboard before 9:30 am on Wednesday due dates for full credit, and by 9:30 am the same Friday for half credit. Waiting till the last minute always runs the risk of internet problems at the worst possible moment, so you are advised NOT to do that.

Grades on exams, quizzes and in the class overall will be assigned as follows: A: 90-100%, B: 80-89%, C: 70-79%, D: 60-69%, F: 0-59%, with the highest grade in the class taken as 100%. That is your insurance against an awful test where the high grade is a 30 (never happens, though—the high score is almost always in the mid to high 90s, if not 100). Note that this is not the same as curving the grades where individuals are measured against the average score in the class.

BE AWARE: The ONLY excuses for missing an exam and making it up (very strictly enforced or the policy simply is not fair to all) will be hospitalization (or a note from a doctor) and/or death in the family. Otherwise, don’t even ask…if you are going on a field trip of some sort with the University, you will be responsible for organizing a faculty member on the trip to proctor the exam or quiz for you. That instructor must then contact me in advance of the trip to get the material and arrange for its delivery. If you opt to miss an exam entirely, you will be given a grade of 0.

Extra Credit There is no provision for extra credit assignments, nor any guarantee that there will be any. Study from the beginning of the course, do the reading, participate in the discussions, HAVE FUN and be prepared to think. Do not count on extra credit assignments materializing to improve your total scores or final grade. They may; they very well may not.

iCLICKER: To help you feel personally involved in the learning process, we use the i>clicker2 to make the course more interactive. You will need an “i>clicker2” remote which can be purchased from the bookstores. Earlier i>clicker models will work, but other brands of clickers will not. Oftentimes, If you purchase a textbook from the local bookstores, you may get a coupon that gets you a discount on the clicker. If you bought an i>clicker2 for another class or previous semester, you will be able to use it in this class. You need to register your clicker for use in this class, and there will be a link on the Blackboard course for you to do this. NOTE: ***You should not go online to register your clicker outside of Blackboard.*** Although we will not use the clickers every day, we will use it at least twice a week beginning the second week of class. You cannot get the class participation points if you do not register an i>clicker2 for use in this class. You cannot record your answers to the questions without the i-clicker2. So if you don’t bring it to class, you cannot earn the class participation point that day.

The clickers allow us to pose questions and have you answer them in class. The system tabulates your responses almost instantaneously, so we can show you the answers given by the entire class. We will use this system to offer opinions, answer review questions, go over difficult material, and otherwise provide feedback to things going on in class. We will not always use the system to grade how you answer each specific question – in some cases there are correct answers to informational questions but in other cases there are simply opinions and all answers are equally OK. Which type of question is being asked will be clearly indicated. Where there is a right answer, you will get 3 points for that right answer, 1 point for any other answer and 0 points for not voting. For opinion questions, you will be recorded as participating (2 points) or not (0 points).
Some people feel that clickers are simply a way of taking attendance, but it is more than that – participating in the question-and-answer sessions helps you learn by promoting a more active learning style. That is why you have to have the clicker and use it to get the participation point – it is not enough to just be in the room and sit there. Even though we will not be using it each day, it would be best if you have it with you for every class.

**ACADEMIC DISHONESTY**: Purdue has a strong policy against cheating, and we work to reduce the likelihood that you can successfully copy off of each other and otherwise try to avoid doing your own work during tests. See the following website for the Purdue policy: [http://www.purdue.edu/studentregulations/student_conduct/index.html](http://www.purdue.edu/studentregulations/student_conduct/index.html). Policies on how exams are administered will be explained in class before the first one. Students who cheat on tests will receive an F on that test and will most likely be expelled from the course with an F grade. All instances of cheating will be reported to the Dean of Students, and further disciplinary action at the university level (e.g., expulsion) is possible. Do not speak to other students during exams, even to translate words into another language for them. Notes and books are not allowed for any tests.

The clickers present a special problem. The way we use the system is designed to reward you for regular participation. Should you give your clicker to a classmate and let them record you as participating in the course, be aware of the following policy: **IF ANYONE IS CAUGHT WITH MORE THAN ONE CLICKER IN CLASS, THE CLICKERS WILL BE CONFISCATED AND ALL PEOPLE INVOLVED WILL BE EXPELLED FROM THE CLASS WITH AN ‘F’ GRADE.** Each clicker is registered for use in this class using its unique serial number, so it is no problem to identify those involved.

**STUDENTS WITH DISABILITIES**: If you have a disability that requires some special accommodation, please talk to Dr. Weil in the first three weeks of the semester to discuss the instruction techniques in this class, tests or any other academic adjustments that you may need. Happy to help you however necessary.

**DIVERSITY STATEMENT**: *In this course, each voice in the classroom has something of value to contribute. Please take care to respect the different experiences, beliefs and values expressed by students and staff involved in this course. We support Purdue’s commitment to diversity, and welcome individuals of all ages, backgrounds, citizenships, disability, sex, education, ethnicities, family statuses, genders, gender identities, geographical locations, languages, military experience, political views, races, religions, sexual orientations, socioeconomic statuses, and work experiences.*

**CLASS CITIZENSHIP**: A potential challenge of learning in a large lecture hall with a lot of people and a wide range of opinions on potentially controversial topics is that there can be an enormous amount of distraction. In an undisciplined classroom, students talking, rustling through pages of the newspaper, surfing the web, or watching movies on their cell phones in your vicinity can make it nearly impossible to pay attention to the class. The same goes for students whose cell phones ring in class. If the professor has to spend class time telling students to stop disrupting the class, it takes away from everyone’s time to learn. Please do your part and ask students around you who are causing disruptions to stop. If your friend is talking to you, tell them to wait until after class. If it gets to the point where we or the TA or proctors have to quiet you down or notice you watching something on your computer or phone, we may penalize you by subtracting points from your grade.

Another challenge of being part of a large class is that many students can be hesitant to ask or answer questions in front of so many of their peers. We recognize that you may be reluctant to speak in class, but we encourage you to try to overcome this reluctance – your participation in class, and your willingness to ask what you may think are “stupid questions” will improve the experience for everyone – including us! At the end of the semester, we may award extra participation points to students who have consistently made useful contributions to the class discussion, or have otherwise taken initiative to improve the learning environment.
Friendly words to the wise: Good for you if you have actually read this far! There is absolutely no substitute for preparing for class and thinking a little prior to the discussions. No…really…there isn’t… The timing is designed to make it worth your while, so that you think about this material about an hour a day (between the reading and the discussions). Waiting until the last minute before an exam to think about what we’ve covered or just winging the discussions in class is NOT a good idea, just in general, but it is especially bad in this class. It has been proven over and over again that thinking about and using the information and methods in genetics takes practicing, and more so than many other disciplines. Students who put off this practice and think they can manage anyway, even where such an approach "has always worked for them in the past", struggle in genetics classes because they have not developed the habit of practicing. Again, it is important to read assignments BEFORE class. You don’t have to understand all of it (you very well may not!), but if you have at least seen it once before lecture and discussion, it will be much clearer in class and you may even find you have a question to ask either me or your discussion group that will clarify things. Write those questions down while you are doing that first reading! Most people, if they sleep between thinking of the question and asking it, often do not remember it at all… It is important to ask questions and above all it is important to THINK. This class is NOT all about memorizing and regurgitating unless you intend no higher than a C grade.

EMERGENCY PREPARENESS PROCEDURES:
Purdue University is a very safe campus and there is a low probability that a serious incident will occur here at Purdue. However, just as we receive a “safety briefing” each time we get on an aircraft, we want to emphasize our emergency procedures for evacuation and shelter in place incidents. Our preparedness will be critical IF an unexpected event occurs! Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Let’s review the following procedures:

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view www.purdue.edu/ea
- If we hear a fire alarm, we will immediately suspend class, evacuate the building, and proceed outdoors, and away from the building. Do not use the elevator.
- If we are notified of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in the lowest level of this building away from windows and doors.
- If we are notified of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights.

EMERGENCY PREPAREDNESS WEBSITE:
http://www.purdue.edu/ehps/emergency_preparedness/index.html

EMERGENCY: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course: the Blackboard online course, our department emails and our office phones (see top of syllabus).
Supporting Documentation

Semesters Offered: Fall Spring Summer

Lecture/Lab Hours: Class 3

Credits: 3

Course Title: Environmental Science and Conservation

A. Justification:

The course is cross-listed as Introduction to Environmental Conservation (FNR 10300) and Introduction to Environmental Science (EAPS 11300/NRES 29000/AGRY 29000) in the course catalog. We have taught the course cross-listed across all four departments for three semesters. To make course registration simpler for the students and blackboard function easier and more efficient for the faculty, the instructors want to change the name and course number. The name should be changed to Environmental Science and Conservation and the course number should be FNR 12500/EAPS 12500/NRES 12500/AGRY 12500. This will make the enrollment process uniform across the departments. The course content will not change from how it has been taught for the past three semesters.

B. Outcomes:

FNR 10300 and EAPS 11300/NRES29000/AGRY29000 are listed as meeting the UCC Science, Technology and Society (STS) foundational outcome. We assume that the new course will continue to be listed as meeting this outcome since we are just making a minor change in the title and course number. The course is also listed as a science elective in the COA. We will apply to the UCC and CSRC to have the course continue to be listed in these categories under the new name and course number.

Outcomes:

At the end of this course, students will be able to:

1. describe the issues, facts, and concepts central to a broad range of environmental and conservation topics,
2. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
3. describe the work done in five scientific disciplines: ecology, environment, resource management, conservation biology, and environmental geology.

This course helps satisfy the following embedded outcomes:

1. Critical Thinking
2. Ethical Reasoning
3. Global Citizenship and Social Responsibility
4. Quantitative Reasoning

i. Methods of evaluation or assessment:

Exams and quizzes ☒
Assessment and scoring of in class participation ☒
Assignments ☒
Class presentations ☐
Other (specify):
FNR 12500 / NRES 12500 / AGRY 12500 / EAPS 12500

Environmental Science and Conservation

Syllabus

**Instructor:** Dr. John G. graveel  
**Office:** 3440 Lilly  
**Email:** jgraveel@purdue.edu  
**Phone:** 494-8060  
**Office Hours:** Wed. 8:30-9:30

**Instructor:** Dr. John B. Dunning, Jr.  
**Office:** G003D Pfendler Hall  
**Email:** jdunning@purdue.edu  
**Phone:** 494-3565  
**Office Hours:** Tues. 1:30-2:30

**Instructor:** Dr. Jeff Dukes  
**Office:** 221A Pfendler Hall  
**Email:** jsdukes@purdue.edu  
**Phone:** 494-1446  
**Office Hours:** Wed. 3:30-4:30

**Instructor:** Dr. Nathaniel Lifton  
**Office:** 3275 Hampton Hall  
**Email:** nlifton@purdue.edu  
**Phone:** 494-0754  
**Office Hours:** By appointment

**TA:** to be determined

**Office:**

**Email:**

When you have questions about the course, send an email first to Megan and she will make sure your question gets to the correct instructor.

**Text and Learning Tools:**
Cunningham, W.P. & M.A. Cunningham. 2017. *Principles of Environmental Science*. McGraw-Hill. Eighth Edition. Available as either a print or E-BOOK; you get the e-book when you purchase Connect (with LearnSmart) through McGraw-Hill’s website. You will also need an i-clicker2 and LearnSmart, the online learning system for this course. Instructions on obtaining all of these are posted on Blackboard.

**Course Overview/Description:**
This course is offered to students interested in an introductory natural resource or environmental science elective. Topics include: an introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. We will discuss issues currently in the news such as climate change, energy policy, protection of endangered species, handling of hazardous waste, and pollution prevention and control.

**Learning Outcomes:**
At the end of this course, students will be able to:

4. describe the issues, facts, and concepts central to a broad range of environmental and conservation topics,
5. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
6. describe the work done in four scientific disciplines: ecology, environment, resource management, and conservation biology.
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<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Week</th>
<th>Learn Smart</th>
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</thead>
<tbody>
<tr>
<td>Aug. 22</td>
<td>Introduction (All Instructors)</td>
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<tr>
<td>24</td>
<td>Science and the environment (Dunning/Lifton)</td>
<td>Week 1</td>
<td>Ch. 1</td>
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<tr>
<td>26</td>
<td>Politics and the environment (Dukes)</td>
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<tr>
<td>29</td>
<td>Economics and the environment (Dunning)</td>
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<tr>
<td>31</td>
<td>Human population growth (Graveel)</td>
<td>Week 2</td>
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<td>Sept. 2</td>
<td>Basic Ecology (Dunning)</td>
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<td>LABOR DAY – no class</td>
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<td>7</td>
<td>Forest and grassland systems (Dunning)</td>
<td>Week 3</td>
<td>Ch. 5, pt 1</td>
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<td>Fire ecology (Dunning)</td>
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<td>Ch. 6</td>
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<td>National Parks and Wilderness (Dunning)</td>
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<td>Biodiversity (Dunning)</td>
<td>Week 4</td>
<td>Ch. 5, pt 2</td>
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<td>Extinction (Dunning)</td>
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<td>Habitat loss and fragmentation (Dunning)</td>
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<td>Genetic conservation (Dunning)</td>
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<td>Endangered species &amp; CITES (Dunning)</td>
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<td><strong>EXAM 1</strong></td>
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<td>Human population (j-curve) (Graveel)</td>
<td>Week 6</td>
<td>Ch. 4</td>
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<td>Food resources agriculture, GMO’s (Graveel)</td>
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<td>Oct. 3</td>
<td>Physical Properties of Soil (Graveel)</td>
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<td>5</td>
<td>Chemical Properties of Soil (Graveel)</td>
<td>Week 7</td>
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<td>Solid waste – landfills/recycling (Graveel)</td>
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<td>10</td>
<td><strong>Fall Break</strong></td>
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<td>Solid toxic and hazardous waste (Graveel)</td>
<td>Week 8</td>
<td>Ch. 14</td>
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<td>Bioremediation (Graveel)</td>
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<td>Toxicology (Graveel)</td>
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<td>Ch. 8</td>
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<td>Emerging Environ. Contaminants (Graveel)</td>
<td>Week 9</td>
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<td>21</td>
<td><strong>EXAM 2</strong></td>
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<td>24</td>
<td>Air resources (Lifton)</td>
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<td>Air pollution (Lifton)</td>
<td>Week 10</td>
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<td>Water resources (Lifton)</td>
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<td>Ch. 11</td>
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<td>Surface water pollution (Lifton)</td>
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<td>Nov. 2</td>
<td>Ground water pollution (Lifton)</td>
<td>Week 11</td>
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<td>4</td>
<td>Geology basics (Lifton)</td>
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<td>Ch. 12</td>
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<td>7</td>
<td>Geology hazards I (Lifton)</td>
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<td>9</td>
<td>Geology hazards II (Lifton)</td>
<td>Week 12</td>
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<td><strong>EXAM 3</strong></td>
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<td>14</td>
<td>Climate change mechanisms &amp; evidence (Dukes)</td>
<td></td>
<td>Ch. 9 Part 1</td>
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<tr>
<td>16</td>
<td>Climate change drivers &amp; projections (Dukes)</td>
<td>Week 13</td>
<td>Ch. 9 Part 2</td>
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Assignments and Grading:

Grading: 3 (out of 4) Hour Exams @ 100 points = 300
          Comprehensive Final Exam* @ 100 points = 100
          Learn Smart** 13 modules @ 7 points = 91
          Lecture participation, iclicker @ 50 points = 50
          Class Participation*** @ 59 points = 59
          Total possible points 600

* Comprehensive Final Exam. The final exam will consist of two parts, Exam 4 and a comprehensive final. Each part will be worth 100 points. Your lowest or missing exam score (including Exam 4) will be dropped. The comprehensive portion of the final will not be dropped.

** LearnSmart modules. There are 13 modules, and each is worth 7 points, totaling 91 points.

*** Class participation. Class participation includes: in class assignments, home work, and case studies.

Grading Scale:
A+ 98% and above, A 93-97.9%, A- 90-92.9%, B+ 87-89.9%, B 83-86.9%
B- 80-82.9%, C+ 77-79.9%, C 73-76.9%, C- 70-72.9%, D+ 67-69.9%, D 63-66.9%, D- 60-62.9%, F below 59.9%

MAKEUP POLICY ON EXAMS: There are four exams and a comprehensive final exam. We will drop your lowest exam score; however, the final is comprehensive and may not be dropped. If you miss a test due to an emergency, talk to Dr. Graveel immediately. All makeups of the midterm exams must be done within a week of the regularly scheduled exam date.

LEARNSMART MODULES: We use LearnSmart, an online homework system to take the place of in-class quizzes. The system will be described in class. There is one module to review for each textbook chapter that is assigned. The good news is that most people who finish the modules get 100% of the points for this part of the class (which was not true for the quizzes); but it does require that you actually DO the online work. Also, keep in mind that access to Blackboard (which you will use to access the LearnSmart modules) and LearnSmart can go down unpredictably, so waiting until the last second to do the assignments is risky.
ICLICKER: One of the difficulties associated with teaching (and learning) in a large-enrollment class is that there is little ability for you to feel personally involved in the learning process. To combat this problem, we use the i>clicker2 to make the course more interactive. You will need an “i>clicker2” remote which can be purchased from the bookstores. Earlier i>clicker models will work, but other brands of clickers will not. If you purchase the textbook from the local bookstores, you may get a coupon that gets you a discount on the clicker. If you bought an i>clicker2 for another class or previous semester, you will be able to use it in this class. You need to register your clicker for use in this class, and there will be a link on the Blackboard course for you to do this.

***You should not go online to register your clicker outside of Blackboard.*** Although we will not use the clickers each day, we will use it at least twice a week after August 26. You cannot get the class participation points if you do not register an i>clicker2 for use in this class.

The clickers allow us to pose questions and have you answer them in class. The system tabulates your responses almost instantaneously, so we can show you the answers given by the entire class. We will use this system to offer opinions, answer review questions, go over difficult material, and otherwise provide feedback to things going on in class. We will not use the system to grade how you answer each specific question – in other words, it is not a way of quizzing you every day. Instead, we will get a summary of who answered each day – essentially you will be recorded as participating in the clicker sessions. If you respond to at least 50% of the questions asked during a class session, then you will get the class participation point for that session. Lower levels of participation will result in zero points.

A MAJOR POINT: you cannot record your answers to the questions without the i-clicker2. So if you don’t bring it to class, you cannot earn the class participation point that day. Some people feel that clickers are simply a way of taking attendance, but it is more than that – participating in the question-and-answer sessions helps you learn by promoting a more active learning style. That is why you have to have the clicker and use it to get the participation point – it is not enough to just be in the room and sit there. Even though we will not be using it each day, it would be best if you have it with you for every class. MAJOR HINT: DAYS BEFORE MAJOR HOLIDAYS OR CAMPUS SOCIAL EVENTS ARE GOOD DAYS TO BE PRESENT AND HAVE YOUR CLICKER WITH YOU. We do not use the clickers on days when we have an exam.

It is possible to grade the responses and give extra points for giving correct answers. We will do this occasionally as a way of earning extra credit. We can’t do it for all questions, because we ask some opinion questions for which there is no correct answer.

ACADEMIC DISHONESTY: Purdue has a strong policy against cheating, and we work to reduce the likelihood that you can successfully copy off of each other and otherwise try to avoid doing your own work during tests. See the following website for the Purdue policy:
http://www.purdue.edu/studentregulations/student_conduct/index.html. Policies on how exams are administered will be explained in class before the first one. One point: you will need a picture ID for all exams. Students who cheat on tests will receive an F on that test and will most likely be expelled from the course with an F grade. All instances of cheating will be reported to the Dean of Students, and further disciplinary action at the university level (e.g., expulsion) is possible. Do not speak to other students during exams, even to translate words into another language for them. Notes and books are not allowed for any tests.

The clickers present a special problem. The way we use the system is designed to reward you for regular participation. However, some of you will be tempted to give your clicker to a classmate and let them record you as participating in the course. Be aware of the following policy: IF
ANYONE IS CAUGHT WITH MORE THAN ONE CLICKER IN CLASS, THE CLICKERS WILL BE CONFISCATED AND ALL PEOPLE INVOLVED WILL BE EXPELLED FROM THE CLASS WITH AN ‘F’ GRADE. Each clicker is registered for use in this class using its unique serial number, so it is no problem to identify those involved.

STUDENTS WITH DISABILITIES: If you have a disability that requires some special accommodation, please talk to Dr. Graveel in the first three weeks of the semester to discuss the instruction techniques in this class, tests or any other academic adjustments that you may need.

DIVERSITY STATEMENT: In this course, each voice in the classroom has something of value to contribute. Please take care to respect the different experiences, beliefs and values expressed by students and staff involved in this course. We support Purdue's commitment to diversity, and welcome individuals of all ages, backgrounds, citizenships, disability, sex, education, ethnicities, family statuses, genders, gender identities, geographical locations, languages, military experience, political views, races, religions, sexual orientations, socioeconomic statuses, and work experiences.

CLASS CITIZENSHIP: A potential challenge of learning in a large lecture hall with hundreds of students is that there can be an enormous amount of distraction. In an undisciplined classroom, students talking, rustling through pages of the newspaper, surfing the web, or watching movies on their cell phones in your vicinity can make it nearly impossible to pay attention to the lecturer. The same goes for students whose cell phones ring in class. If the professor has to spend class time telling students to stop disrupting the class, it takes away from everyone’s time to learn. Please do your part and ask students around you who are causing disruptions to stop. If your friend is talking to you, tell them to wait until after class. If it gets to the point where we or the TA or proctors have to quiet you down or notice you watching something on your computer or phone, we may penalize you by subtracting points from your grade.

Another challenge of being part of a large class is that many students can be hesitant to ask or answer questions in front of so many of their peers. We recognize that you may be reluctant to speak in class, but we encourage you to try to overcome this reluctance – your participation in class, and your willingness to ask what you may think are “stupid questions” will improve the experience for everyone – including us! At the end of the semester, we may award extra participation points to students who have consistently made useful contributions to the class discussion, or have otherwise taken initiative to improve the learning environment.

EMERGENCY PREPARENESS PROCEDURES:
Purdue University is a very safe campus and there is a low probability that a serious incident will occur here at Purdue. However, just as we receive a “safety briefing” each time we get on an aircraft, we want to emphasize our emergency procedures for evacuation and shelter in place incidents. Our preparedness will be critical IF an unexpected event occurs! Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Let’s review the following procedures:

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view www.purdue.edu/ea
- If we hear a fire alarm, we will immediately suspend class, evacuate the building, and proceed outdoors, and away from the building. Do not use the elevator.
• If we are notified of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in the lowest level of this building away from windows and doors.
• If we are notified of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights.

EMERGENCY PREPAREDNESS WEBSITE:  
http://www.purdue.edu/ehps/emergency_preparedness/index.html

EMERGENCY: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course: the Blackboard online course, our department emails and our office phones (see top of syllabus).

FURTHER INFORMATION ABOUT LEARNSMART / CONNECT:
ACCESS: Connect is purchased online through the course Blackboard page. When you purchase Connect online, you will get an interactive eBook version of the required textbook for this course. If you prefer to purchase the text through the bookstore, you should get a Connect access codes packaged with the new textbook (however, this is much more expensive than purchasing the e-book online, see below). NOTE: You can register for a free trial period in Connect and have access to Learnsmart and the textbook without paying. This trial period is for a limited time period (typically three weeks, so it won’t get you through the semester but might be an option if you have limited funds at the start). If you prefer to read a hard copy of the textbook, you can select an option to purchase a looseleaf version of the text when you register for Connect (typically the looseleaf text costs $25 or less). Connect should cost about $85 (or $110 with the looseleaf textbook). Hard copies of the textbook now cost over $200 but the access code is included so you won’t have to pay more for the Learnsmart program.
REGISTRATION: To register in Connect, please click on the first link for a Learnsmart module (textbook chapter) on the course Blackboard webpage. This will direct you to the publisher’s webpage. After you review your options, click “Register Now.”
SUPPORT & TIPS: Please review the “Registering for Connect (Learnsmart)” document (available on Blackboard) for help getting started with Connect and LearnSmart. If you have any issues while registering or using Connect, please contact McGraw-Hill’s Customer Experience team through http://www.mhhe.com/support or at 800-331-5094. To avoid problems related to unexpected technical issues, you are advised not to wait until the last moment to complete assignments. Do NOT contact the professors or your TA about problems with LearnSmart until you have tried to address them with McGraw-Hill staff. It is unlikely that we will be able to help you with this system as much as the help staff (after all, it’s their job!).
A. COURSES TO BE DELETED

None

B. COURSES TO BE ADDED

None

C. COURSES TO BE CHANGED

BCHM 10000 – restricted to freshmen and sophomores (classifications 0, 1, 2 and 3)

D. CURRICULAR CHANGES

Justification/Rationale: BCHM 10000 is an introductory course in biochemistry intended for lower-division undergraduates that does not require any college science courses as prerequisites. Enrollment in this lecture class is limited to 70 students each semester, and the class has been oversubscribed during the past several years. Thus, we would like to restrict BCHM 10000 to freshmen and sophomores to provide priority access and space for lower-division undergraduates in this introductory class. In addition, upper-division students with previous chemistry and biology experience do not benefit from an introductory-level biochemistry course that is largely redundant with their previous course material.
Department of Entomology
Proposed Course and Curricular Changes

A. COURSES TO BE DELETED

None

B. COURSES TO BE ADDED

ENTM 10100: Insect Biology and Societal Grand Challenges
An introduction to the roles of insect biologists in addressing societal grand challenges. 1 cr., typically offered Fall semester. Prerequisites: None.

ENTM 10200: The Practice of Science
A critical examination of science, best practices for conducting science, the contribution of research to knowledge accumulation, and the ethical obligations of scientists. 2 cr., typically offered Fall semester. Prerequisites: None.

ENTM 20100: Scientific and Technical Communication
Students gain a foundation for communicating science and insect biology at multiple levels through study and practice. Prior completion of a college-level composition course is strongly recommended. 3 cr., typically offered Fall semester. Prerequisites: BIOL 11000 and 11100 or BTNY 11000 or equivalent or consent of instructor.

ENTM 25300: Insect Physiology and Biochemistry
Introductory course in insect cell biology, biochemistry, and physiology including structures and functions of insect internal and external tissues and organs. 4 cr., typically offered Spring semester. One year of college biology or equivalent knowledge is expected. Prerequisites: None.

ENTM 30100: Experimentation & Analysis
Introduction to experimentation and quantitative data analysis in the life sciences with a focus on examples from insect biology. 3 cr., typically offered Fall semester. Prerequisites: STAT 301 or equivalent.

ENTM 31200 Insect Chemical Ecology
An overview of the structure and function of natural and synthetic chemical products in insect ecology. 3 cr., typically offered Spring semester. One year of college biology and one year of college chemistry or equivalent knowledge is expected. Prerequisites: None.

ENTM 32810: Practical Molecular Biology
Students explore molecular technology commonly used in population genetics and diagnostics and apply them to questions in Insect Biology and Forensics. 3 cr., typically offered Spring semester. Prerequisites: AGRY 32000 or BIOL 24100 or FNR 30500
ENTM 35300: Insecticides & Environment
Insecticides, their interactions with biological organisms and the environment, regulatory policies, environmental and human health outcomes, and current controversies. 3 cr., typically offered Spring semester. A year of college biology and college chemistry or equivalent knowledge is expected. Prerequisites: None.

ENTM 39300: Insect Biology Practicum
Imbedded programmatic experiences for undergraduate students in Entomology including focused reflection on the knowledge, skills, and values necessary for contributions in the discipline. 0.5 cr., offered Fall and Spring semesters. Limited to Insect Biology Majors only. Instructor Permission Required.

ENTM 40100: Addressing Grand Challenges Through Insect Biology
This course engages students in an examination of societal grand challenges by identifying the problems, understanding the current state of knowledge, identifying knowledge gaps and implementing possible solutions. 1 cr., typically offered Spring semester. Limited to Insect Biology Majors, Upper Division only. Prerequisites: none.

ENTM 41000: Applied Insect Biology
Identification, biology and management of insects associated with global food and energy security and human and animal health and well-being. 2 cr., typically offered Fall semester. Students are expected to have a knowledge of college biology. Prerequisites: None.

ENTM 41001: Insect of Urban Landscapes
Students focus on identification and biology of insects associated with turfgrass and ornamental plants. The role of experimentation in applied entomology is examined. 1 cr., typically offered Fall semester. Prerequisites/Co-requisites: ENTM 41000.

ENTM 41002: Insects of Agricultural Crops
Students focus on identification, biology, and management of pests of agricultural crops, identification of natural enemies, and application of scientific method applied entomology. 1 cr., typically offered Fall semester. Prerequisites/Co-requisites: ENTM 41000.

ENTM 49310: Insect Biology Capstone Experience
Insect Biology Majors complete a capstone project under the guidance of a faculty mentor. 2 cr./arranged, can be repeated for a total of 4 cr., offered Fall, Spring and Summer Semester. Limited to Insect Biology Majors only. Instructor Permission Required

ENTM 49390: Insect Biology Capstone Forum
Students apply their accumulated knowledge to grand challenges and careers in insect biology. 1 cr., typically offered Spring semester. Limited to Insect Biology Majors only. Prerequisites/Co-requisites: ENTM 49310.
C. COURSES TO BE CHANGED
None

D. CURRICULAR CHANGES
Retire Entomology Minor
New Insect Biology Minor
Revised Insect Biology – Major
Supplemental Documents

ENTM 10100: Insect Biology and Societal Grand Challenges

Semesters Offered: Fall

Lecture: 1 hr

Credits: 1

Justification/Rationale: The curriculum for Insect Biology majors is designed to prepare graduates to meet societal grand challenges in a number of important areas, e.g., biodiversity and invasive species, global food and energy security, human health and well-being, STEM education, and the bioeconomy. This course will raise awareness of important societal issues and introduce students to ways insect biologists bring solutions to problems of global importance. It will also serve as a scaffold for students to organize and help design their course of study by placing it in a larger societal framework.

Learning Outcomes:
ENTM 10100 will NOT be nominated for inclusion on a University Foundational Core or CoA Core course list.

Entomology discipline-specific learning outcomes
1. Evaluate the scientific process as to accuracy, precision, and error sources and mitigation.
2. Describe the major causes and consequences of species diversity.
3. Discuss and provide examples of the interactions between insects and human cultures.
4. Communicate how insects are used as models for the development of new problem solving approaches in materials, processes and systems.

Assessment of learning outcomes
Entomology discipline-specific learning outcomes will be assessed through a combination student journaling, discussion of popular articles and media, quizzes and homework assignments, and oral presentation.

Contact for Information
Instructor: Dr. Matthew Ginzel
Email: mginzel@purdue.edu
Phone: 494-9369
Office: WSLR 228
Office hours: TBA
Course Syllabus:

ENTM 10100: Insect Biology and Societal Grand Challenges

Instructor: Dr. Matthew Ginzel
Email: mginzel@purdue.edu
Office: WSLR 228
Office hours: TBD

Credit hours: 1 (Lecture)

Course Description
This discussion course familiarizes students with societal grand challenges as viewed through the lens of entomology and serves as a scaffold for Insect Biology Majors to organize their course of study.

Prerequisites: None

Required Textbooks and other readings materials: None

Course Objectives
After completing this course, students will be able to:

1. Appreciate the scope of societal grand challenges
2. Understand and demonstrate where Insect Biology and grand challenges intersect
3. Evaluate and critique popular literature and media surrounding these issues
4. Identify gaps in our current knowledge and understand future needs

Student Assessment:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Reflections (10 at 15 pts each)</td>
<td>150</td>
</tr>
<tr>
<td>Critique and Discussion Questions (4 at 50 pts. each)</td>
<td>200</td>
</tr>
<tr>
<td>Participation in group Discussions (4 at 50 pts. each)</td>
<td>200</td>
</tr>
<tr>
<td>Quizzes or homework assignments (10 at 20 pts. each)</td>
<td>200</td>
</tr>
<tr>
<td>Oral Presentation</td>
<td>250</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>1000</strong></td>
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</tbody>
</table>

Grading Scale/Distribution:
A = 90+-%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.
Class Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Grand Challenges concept</td>
</tr>
<tr>
<td>2</td>
<td>Biodiversity: Climate change</td>
</tr>
<tr>
<td>3</td>
<td>Biodiversity: Invasive species</td>
</tr>
<tr>
<td>4</td>
<td><strong>Discussion on climate change and invasive species</strong></td>
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<tr>
<td>5</td>
<td>Biodiversity: Conservation and ecosystem services</td>
</tr>
<tr>
<td>6</td>
<td>Biodiversity: Pollinator protection</td>
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<tr>
<td>7</td>
<td><strong>Discussion on conservation and pollinator protection</strong></td>
</tr>
<tr>
<td>8</td>
<td>Global Food and Energy Sustainability: Plant protection and entomophagy</td>
</tr>
<tr>
<td>9</td>
<td>Global Food and Energy Sustainability: Biofuels and Livestock animal health and well-being</td>
</tr>
<tr>
<td>10</td>
<td><strong>Discussion global food and energy sustainability</strong></td>
</tr>
<tr>
<td>11</td>
<td>Human Health and Well-being: Insect-borne diseases and parasites of humans</td>
</tr>
<tr>
<td>12</td>
<td>Human Health and Well-being: Veterinary entomology and entomophobia</td>
</tr>
<tr>
<td>13</td>
<td><strong>Discussion on Human Health and Well-being</strong></td>
</tr>
<tr>
<td>14</td>
<td>Future needs/opportunities and knowledge gaps</td>
</tr>
<tr>
<td>15</td>
<td><strong>Student Presentations on grand challenges</strong></td>
</tr>
<tr>
<td>16</td>
<td><strong>Student Presentations on grand challenges</strong></td>
</tr>
</tbody>
</table>

**Reflections**
At the end of each lecture period (except when there are discussions or group presentations), students will be required to turn in a reflection journal entry on the topic covered that day. Students may write about anything that stood out to them about that day’s lecture or activity (e.g., concepts they had difficulty understanding, or those they found particularly interesting). Reflections should be a paragraph in length, and will be worth 10 pts, and due to me via email by midnight of the same days as lecture.

**Discussions of popular article/media**
As a group, we will discuss current popular literature or media related to topics presented in the preceding lecture. The articles or video will be provided on Blackboard Learn one week prior to the discussion. For each discussion period students will be required to turn in a one-paragraph critique of one of the papers along with three discussion questions relating to each of the assigned papers. Students will also receive points based on their participation in discussions. Further explanation of the grading and format of these discussions will be provided.

**Quizzes or homework assignments**
For each lecture period (10), students will either have a low-stakes take home quiz or homework assignment related to material covered that day. These assignments will be due at the beginning of the following class period and will be worth 10 points. Late assignment will not be accepted and there will be no opportunities to make up these points if the assignment is not completed on time.
**Presentation**

At the end of semester, students will give a 10-minute oral presentation on a topic of their choice that describes current work that addresses a societal grand challenge. An outline of the presentation will be due during week 12 of the semester.

**Online support:** This course is supported by an online resource (Blackboard Learn) that provides a secure and convenient environment for disseminating course material. Students are able to view grades and download class material. This site also provides chat rooms and discussion forums where students can post comments or opinions and interact with classmates.
Supporting Documentation

ENTM 10200: The Practice of Science

Semesters Offered:  Fall

Lecture Hours:  2 hr

Credits:  2

Course Justification:  As students begin their training in a scientific discipline, it is critical that they develop an understanding of what science is, characteristics that distinguish science from other forms of scholarship, what scientists do and how they communicate, what research is and how it should be conducted, and an overview of the ethical expectations of practicing scientists.

Learning Outcomes:
ENTM 10200 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 10200 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes
1. Identify and practice the fundamental aspects of science: observation, explanation and investigation
2. Use observation and logic to develop falsifiable hypotheses and testable predictions
3. Quantitatively analyze data
4. Evaluate the scientific process as to accuracy, precision, and error sources and mitigation
5. Define, explain and defend the presence of ethical guidelines in the practice of science
6. Distinguish between and identify why a piece of written or oral communication is science or pseudoscience

Assessment of Learning Outcomes
Entomology discipline-specific learning outcomes will be assessed by a combination of weekly writing assignments, a written project report, and an oral report presentation.

Contact for Information:
Peter E. Dunn  Jeffrey D. Holland
494-7739  494-3996
pedunn@purdue.edu  jdhollan@purdue.edu
WSLR 206D  SMTH B17
Course syllabus:

ENTM 10200: The Practice of Science

Instructor: Peter E. Dunn, Jeffrey D. Holland
Email: pedunn@purdue.edu, jdhollan@purdue.edu
Phone: 494-3996 (Dunn), 494-7739 (Holland)
Office Hours: TBD

Credit Hours: 2 credits (lecture)

Course Description: This course will engage students in a critical examination of what science is, how science should be conducted, the contribution of research to the larger picture of knowledge accumulation, and the ethical obligations of scientists. The course will do this through the use of assigned readings, class discussion, and practical exercises. Students will gain experience in the identification of a researchable problem drawn from one of the grand challenges in their chosen scientific discipline, and the design of a research strategy to address the defined problem.

Prerequisites: None

Required Textbooks and other materials:

Course Objectives:
1. To introduce students to the fundamental components of conducting scientific investigations (observation, explanation, and investigation) and provide an opportunity to practice each component.
2. To introduce students to the concept of falsifiable hypotheses and their role in the practice of science.
3. To introduce students to concepts underlying approaches to the quantitative analysis of data.
4. To review the importance of accuracy, precision, and the identification and mitigation of sources of error in data collection and analysis.
5. To introduce the ethical expectations of peers, sponsors, and the general public in the practice of science.
6. To introduce students to the distinction between science and pseudoscience, and provide tools to recognize each.
**Student Assessment:**
Students will be evaluated on the following basis:

- **240 pts** Weekly Writing Assignments (12 × 20 pts each)
- **100 pts** Written Project report
- **100 pts** Oral Project Report

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**440 pts** total

**Grading Scale/Distribution:**
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

**Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.**
## Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction; Culture of Science: Nature of Scientific Knowledge</td>
<td>Readings</td>
</tr>
<tr>
<td>2</td>
<td>Culture of Science: Scientists and the Scientific Community; Scientific Ethics</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>3</td>
<td>Culture of Science: Scientific Institutions and Societies</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>5</td>
<td>Ideas in Science: Scientific Controversy, Creativity in Science</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>6</td>
<td>Data: Data Analysis and Interpretation; Uncertainty, Error, and Confidence; Statistics in Science</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>7</td>
<td>Data: Using Graphs and Visual Data in Science</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>8</td>
<td>Research Methods: Introduction to Scientific Methods, Experimentation in Scientific Research</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>9</td>
<td>Research Methods: Description in Scientific Research, Comparison in Scientific Research</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>10</td>
<td>Research Methods: Modeling in Scientific Research</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>11</td>
<td>Scientific Communication: Understanding Scientific Journals and Articles, Utilizing the Scientific Literature</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>12</td>
<td>Scientific Communication: Peer Review in Scientific Publishing</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>13</td>
<td>Scientific Communication: The How and Why of Scientific Meetings</td>
<td>Readings, Weekly Writing Assignment</td>
</tr>
<tr>
<td>14</td>
<td>10 min Oral Project Reports</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>10 min Oral Project Reports</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>No Final Exam</td>
<td></td>
</tr>
</tbody>
</table>
ENTM 20100: Scientific and Technical Communication

Semesters Offered: Fall

Lecture Hours: 3 hrs

Credits: 3

Course Justification/Rationale: Although entomology undergraduate majors at Purdue take an English composition course during their freshman year, undergraduate writing skills, on average, remain extremely poor. This is likely in large part due to the fact that scientific writing is substantially different in style, format, and content than standard writing instruction that occurs in an English department. Poor writing skills make it difficult for undergrads to effectively transition into graduate school or many other post-graduation professional opportunities that require effective communication skills. Further, we expect students to complete an oral presentation and written paper as part of their capstone experience during their senior year and both written and oral presentations are standard components of many courses in the overall curriculum. Presently students do not receive formal instruction on techniques to improve their oral and written science communication abilities. This course is designed to fill these gaps.

Learning Outcomes:
ENTM 20100 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 20100 for inclusion on the CoA Additional Written and/or Oral Communication Selectives List.

Entomology discipline-specific learning outcomes
1. Explain the basic structure of a scientific journal article and which content is appropriate to each section.
2. Write a clear and concise scientific article for both peer and non-scientific audiences.
3. Constructively critique a scientific manuscript.
4. Translate a written summary of research problems, procedures, results and conclusions into a concise oral presentation and an effective poster presentation.
5. Prepare and incorporate effective visual elements to support oral presentations of scientific research to both peer and non-scientific audiences.

Assessment of Learning Outcomes
Entomology discipline-specific learning outcomes will be assessed by a combination of writing assignments and oral presentations.

Contact for Information:
Ian Kaplan
494-7207
ikaplan@purdue.edu
SMTH B1D
Course syllabus:
ENTM 20100: Scientific and Technical Communication

Instructor: Ian Kaplan  
Email: ikaplan@purdue.edu  
Phone: 494-7202  
Office Hours: TBD

Instructor: Peter Dunn  
Email: pedunn@purdue.edu  
Phone: 494-3996  
Office Hours: TBD

Credit Hours: 3.0

Course Description: This course provides a foundation for undergraduate students in communicating science at multiple levels. Students gain practice in both written and oral presentations appropriate for a variety of audiences, including fellow scientists and the non-scientific public. Emphasis is upon practice and implementation of scientific communication. Prior completion of a college-level composition course is strongly recommended.

Prerequisites: BIOL 11000 and BIOL 11100 or BTNY 11000 or equivalent or consent of the instructor.


Course Objectives:

1. Students will develop and practice skills to describe research and present results and conclusions from research to peers and to non-scientist audiences both in written and oral formats.

2. Students will understand the difference between scientific and science writing and will be able to effectively communicate science to various general public audiences both orally and through writing.
**Student Assessment:**
Assessment is based upon the practice and implementation of science communication skills. Students will be evaluated on the following basis:

<table>
<thead>
<tr>
<th>Points</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 pts</td>
<td>Weekly book chapter assignments (18 @ 10 points each)</td>
</tr>
<tr>
<td>120 pts</td>
<td>Term paper</td>
</tr>
<tr>
<td>200 pts</td>
<td>Lab reports (2 @ 100 pts each)</td>
</tr>
<tr>
<td>50 pts</td>
<td>7 min, non-technical, recitation describing lab project</td>
</tr>
<tr>
<td>50 pts</td>
<td>Paper – write a short article about a scientific discovery for a specific TBD audience.</td>
</tr>
<tr>
<td>50 pts</td>
<td>Paper - translate a scientific paper (provided) into a popular article for a general audience.</td>
</tr>
<tr>
<td>100 pts</td>
<td>10 min oral presentation of research paper with slides</td>
</tr>
<tr>
<td>100 pts</td>
<td>Poster preparation and presentation</td>
</tr>
<tr>
<td>75 pts</td>
<td>Peer review of other students’ written and oral presentations</td>
</tr>
<tr>
<td>75 pts</td>
<td>Class attendance and participation in weekly discussions</td>
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</tr>
<tr>
<td>1,000 pts</td>
<td>total</td>
</tr>
</tbody>
</table>

**Grading Scale/Distribution:**
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

**Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.**
## Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to the scientific literature</td>
<td>Learn how to search for scientific journal articles</td>
</tr>
<tr>
<td>2</td>
<td>How to approach scientific writing</td>
<td>Chapters 1-3 in Schimel</td>
</tr>
<tr>
<td>3</td>
<td>Reading scientific papers: The good, the bad, and the ugly</td>
<td>Assigned published article reading</td>
</tr>
<tr>
<td>4</td>
<td>Key points for good writing</td>
<td>Chapters 4-6 in Schimel</td>
</tr>
<tr>
<td>5</td>
<td>Qualities to address in your writing: The challenge, action, and resolution</td>
<td>Chapters 7-9 in Schimel</td>
</tr>
<tr>
<td>6</td>
<td>Internal structure; Paragraphs and sentences</td>
<td>Chapters 10-12 in Schimel</td>
</tr>
<tr>
<td>7</td>
<td>Maintaining writing flow &amp; word choice; Concise &amp; “to-the-point” writing</td>
<td>Chapters 13,15,16 in Schimel</td>
</tr>
<tr>
<td>8</td>
<td>Polishing the final document</td>
<td>Chapter 17 in Schimel</td>
</tr>
<tr>
<td>9</td>
<td>Writing/speaking for the public</td>
<td>Chapter 19 in Schimel</td>
</tr>
<tr>
<td>10</td>
<td>Writing/speaking for the public</td>
<td>Chapter 20 in Schimel</td>
</tr>
<tr>
<td>11</td>
<td>Preparing effective posters</td>
<td>Digital poster preparation</td>
</tr>
<tr>
<td>12</td>
<td>Oral presentations: techniques</td>
<td>Powerpoint preparation</td>
</tr>
<tr>
<td>13</td>
<td>Oral presentations slides/aides</td>
<td>Class oral assessment</td>
</tr>
<tr>
<td>14</td>
<td>Oral presentations</td>
<td>Class oral assessment</td>
</tr>
<tr>
<td>15</td>
<td>Oral presentations</td>
<td>Class oral assessment</td>
</tr>
<tr>
<td>16</td>
<td>Final exam week</td>
<td></td>
</tr>
</tbody>
</table>


Supporting Document

ENTM 25300: Insect Physiology and Biochemistry

Semesters Offered: Spring

Lecture/Lab Hours: 3 hrs/2 hrs

Credits: 4

Justification/Rationale: A major focus of any curriculum on insect biology will inevitably be the many dimensions of diversity exhibited by insect taxa. However, it is equally important that students of insect biology are also familiar with those aspects of biology that all insects have in common both with other insects and with other animals: their cell biology, biochemistry, and physiology. An understanding of physical and chemical principles and processes that enable and limit insect bodily functions and interactions with their environment is essential to appreciate both the flexibility that enables insects to thrive in such diverse ecological niches and the constraints that limit the insect body form and specify requirements for survival and reproduction.

Learning Outcomes:
ENTM 25300 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 25300 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes

1. Demonstrate an understanding of how organisms, organ systems, organs, cell, and bio-molecules carry out essential functions in insects.
2. Describe the structure and function of nucleic acids, proteins, carbohydrates, and lipids in insect cells.
3. Diagram the central dogma of biology.
4. Identify the principal subcellular organelles found in insect cells and describe their functions.
5. Identify and describe the structure and principal functions of the insect integument, alimentary canal, nervous system, tracheal system, fat body, reproductive system, and circulatory system.
6. Describe the structure of the insect egg and the principal phases of insect embryonic and post-embryonic development.
7. Define the term “hormone” and identify the principal hormones controlling the progress of insect postembryonic development, growth, and reproduction.
8. Explain the role of the immune system in insect survival and describe the components of the insect innate immune response.
9. Quantitatively analyze data.
Assessment of learning outcomes
Entomology discipline-specific learning outcomes will be assessed by a combination of
four online quizzes, three one-hour in class exams, ten laboratory reports, and a final
exam.

Contact for information:
Peter E. Dunn
494-3996
pedunn@purdue.edu
WSLR 206D
Course syllabus:

**ENTM 25300: Insect Physiology and Biochemistry**

**Instructor:** Peter E. Dunn  
**Phone:** 494-3996  
**E-mail:** pedunn@purdue.edu  
**Office:** WSLR 206D  
**Office Hours:** TBD

**Credit Hours:** 4 credits (lecture: 3, lab:1)

**Course Description:** Introductory course in insect cell biology, biochemistry, and physiology covering the structure and function of insect internal and external tissues and organs; insect development and metabolism and their endocrine control; insect immune responses; and neural systems controlling interactions of insects with their environments. Laboratory illustrates principles described in lecture and provides practice of common insect biochemical and physiological procedures from the molecular to system level. Students should have taken introductory courses in or have an understanding of basic biology, general chemistry, and entomology.

**Prerequisites:** none

**Required Textbooks and other readings materials:**

Course Objectives:
(1) To introduce students (i) to the structure and functions of insect cells, the major internal organ systems of insects, the insect integument, and homeostatic mechanisms; (ii) to insect development and reproduction, and their endocrine control; and (iii) to the neural mechanisms that underlie the interactions of insects with their environment and all coordinated behavior.

(2) To introduce students to the physical and chemical principles that underpin all of animal physiology.

(3) To emphasize the dependence of function on structure in physiology and biochemistry.

(4) To provide students of entomology with a new and different perspective on insects, namely the perspective of the biochemist and physiologist who perceive insects as individual animals interacting with their surroundings, and as organized cell populations functioning coordinately to allow the individual to grow, differentiate, and reproduce.

(5) To introduce students to the nature of and commonly used experimental procedures for research in insect physiology and biochemistry.

Student Assessment:
Every two weeks during the semester, students will complete either a quiz (online) or a one hour exam (in class). Students will submit 10 lab reports. A final examination will be administered during final exam period.

Students will be evaluated on the following basis:

100 pts Quizzes (4 @ 25 pts each)
300 pts 1 hour examinations (3 @ 100 pts each)
200 pts Lab Reports (10 @ 20 pts each)
100 pts Final Examination
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700 pts total

Grading Scale/Distribution:
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less
Grades are computed by creating a point distribution from the above scale and the final points for the course. The distribution looks like this:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>630 to 700</td>
</tr>
<tr>
<td>B</td>
<td>560 to 629</td>
</tr>
<tr>
<td>C</td>
<td>490 to 559</td>
</tr>
<tr>
<td>D</td>
<td>420 to 489</td>
</tr>
<tr>
<td>F</td>
<td>419 or less</td>
</tr>
</tbody>
</table>

Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.
## Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
<th>Assignment</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nature of physiology, Surface Area-Volume Relationship, Chemical composition and structural organization of cells</td>
<td>Assigned readings</td>
<td>Lab introduction: Review rubric for lab reports; Use of pipets and balance</td>
</tr>
<tr>
<td>2</td>
<td>Structure of cell membranes, Permeation of cell membranes, Energetics of cells</td>
<td>Assigned readings</td>
<td>Lab introduction: Acids, bases, and buffers</td>
</tr>
<tr>
<td>3</td>
<td>Signaling systems: hormones; Insect reproductive system; Insect eggs and embryonic development</td>
<td>Assigned readings</td>
<td>Lab introduction: Spectrophotometry; Bradford Protein Assay</td>
</tr>
<tr>
<td>4</td>
<td>Insect integument: structure and function; Molt cycle and postembryonic development; Metamorphosis</td>
<td>Assigned readings</td>
<td>Insect dissection (Lab report)</td>
</tr>
<tr>
<td>5</td>
<td>Diapause; Hormonal control of insect development; Hormonal control of insect reproduction</td>
<td>Assigned readings</td>
<td>Role of cuticular lipids in water balance (Lab report)</td>
</tr>
<tr>
<td>6</td>
<td>Insect nutrition; Insect alimentary canal; Digestion: biochemistry and physiology; Holobiont and role of symbionts</td>
<td>Assigned readings</td>
<td>Bioassay of insect developmental hormones (Lab report)</td>
</tr>
<tr>
<td>7</td>
<td>Nutrient Absorption; Hemolymph, heart, and circulation</td>
<td>Assigned readings</td>
<td>Postembryonic growth; Effect of diet composition (Lab report)</td>
</tr>
<tr>
<td>8</td>
<td>Insect immune system</td>
<td>Assigned readings</td>
<td>Insect hemolymph: Collection and hemocytes (Lab report)</td>
</tr>
<tr>
<td>9</td>
<td>Fat body and intermediary metabolism; Nitrogen metabolism and excretion</td>
<td>Assigned readings</td>
<td>Lysozyme assay; Induction of lysozyme by injection of bacterial peptidoglycan (Lab report)</td>
</tr>
<tr>
<td>10</td>
<td>Principles of respiration</td>
<td>Assigned readings</td>
<td>Lysozyme purification: gel filtration (Lab report)</td>
</tr>
<tr>
<td>11</td>
<td>Nervous systems: structure and function; Action potentials</td>
<td>Assigned readings</td>
<td>Lysozyme purification: ion exchange (Lab report)</td>
</tr>
<tr>
<td></td>
<td>Sensory system: generator potential; Sensory systems: chemo/mechano-receptors</td>
<td>Assigned readings Hour exam 3</td>
<td>Polyacrylamide gel electrophoresis (Lab report)</td>
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<tr>
<td>12</td>
<td>Sensory system: vision; Biochemistry of synaptic transmission</td>
<td>Assigned readings</td>
<td>Western blots (Lab report)</td>
</tr>
<tr>
<td>13</td>
<td>Muscles: structure and contraction</td>
<td>Assigned readings</td>
<td>Action potentials - demonstration</td>
</tr>
<tr>
<td>14</td>
<td>Biochemistry/energetics of flight; Pheromones and Communication</td>
<td>Assigned readings</td>
<td>Electroantennogram - demonstration</td>
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<tr>
<td>15</td>
<td></td>
<td>Final Examination</td>
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<tr>
<td>16</td>
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</tbody>
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ENTM 30100: Experimentation & Analysis

Semester Offered: Fall

Lecture/Lab Hours: 3 hours (Lecture)

Credit: 3.0

Justification/Rationale: Successful design of experiments, data analysis and interpretation of results are necessary for a career in insect biology. This course supplements the introduction to statistics course required of all undergraduate students in the College of Agriculture at Purdue by providing opportunity to explore experimental designs and analyses frequently used in the study of insect biology. The course uses case studies taken from insect biology. This course may be useful to any student interested in applied biology and is a required course in the Insect Biology Major.

Learning Outcomes:
ENTM 30100 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 30100 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology Discipline-Specific Outcomes
(1) Quantitatively analyze data

Assessment of learning outcomes
The discipline-specific outcome, quantitatively analyze data, will be met and assessed through lecture, readings, team presentations and assignments (see syllabus, below). Students review examples of data analysis in their readings and learn through analyzing data. The final exams will provide additional assessment. Where possible, outcomes are taught using active learning techniques.

Course Contact Information:
Jonathan Neal
765.494.4594
jneal@purdue.edu
SMTH 127E
Course syllabus:

ENTM 30100: Experimentation & Analysis

Instructor: Jonathan Neal  
Phone: 494-4594  
E-mail: jneal@purdue.edu  
Office: SMTH 127E  
Office Hours: TBD

Instructor: Doug Richmond  
Phone: 494-0399  
E-mail: drichmond@purdue.edu  
Office: SMTH 105C  
Office Hours: TBD

Course Description:  Introduction to experimentation and quantitative data analysis in the life sciences with a focus on insect examples. Part 1 is a comprehensive exploration of factors that are necessary to consider in designing a successful experiment. Part 2 is a study in analysis of data generated by experiments, common mathematical models useful for describing biological data, interpretation of results, and translation into recommendations based on analysis. The focus is on examples from insect biology, but is applicable for all undergraduate students who plan to engage in life sciences careers.

Prerequisites: STAT 30100

Required Textbooks and other materials:
- Statistica 13 Analytics software

Course Objectives:  
Students should be able to:
- Start with an observation and design an appropriate experiment that recognizes and avoids common pitfalls
- Apply the general linear model and its variants in data analysis.
- Appropriately use common basic statistical packages

Student Assessment:  
Students will be evaluated on the following basis:
60% Assignments  
25% Final Project  
5% Presentation  
10% Final Exam

Assignments: There will be 12 graded assignments that accompany readings and lecture  
Group Project: Students will work in teams to design an experiment that will test an hypothesis. Experimental designs must address all the points of emphasis for the course. (See topics list). Students will make an oral presentation of their experimental design to the class.

Grade Calculation
A = 90+%  
B = 80-89%  
C = 70-79%  
D = 60-69%  
F = 59% or less
Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.

**Class Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Importance of good design, common myths, random variation, confounding factors, manipulative and observational studies, hypothesis testing</td>
<td>Assignment 1: Practice observations, formulating hypotheses, hypothesis writing critique</td>
</tr>
<tr>
<td>2</td>
<td>Pilot studies, qualities of lab and field studies, in vivo or in vitro studies, recording data,</td>
<td>Assignment 2: Design Pilot Study</td>
</tr>
<tr>
<td>3</td>
<td>Measurements, calibration, accuracy and precision, bias, intra- and inter- observer variability, repeatability, sampling, selecting levels for treatments</td>
<td>Assignment 3: Design of sampling schemes, Setting Standards</td>
</tr>
<tr>
<td>4</td>
<td>Sources of variation, methods of managing variation, replication and pseudo-replication randomization</td>
<td>Assignment 4: Randomization and Replication</td>
</tr>
<tr>
<td>5</td>
<td>Ethics, Experimental Size, formal power analysis, factors affecting power, Type 1 and Type 2 errors</td>
<td>Assignment 5: Size and power</td>
</tr>
<tr>
<td>6</td>
<td>Controls: positive, negative, concurrent, historic, blind and double blind procedures</td>
<td>Begin Design Project</td>
</tr>
<tr>
<td>7</td>
<td>Theories, Hypotheses, and Statistics, Exploratory data analysis and graphic display</td>
<td>Reading: Scheiner &amp; Gurevitch pgs. 3-18; 81-103 Assignment 6: Types of data, box and whisker plots, normal probability plots, frequency plots</td>
</tr>
<tr>
<td>8</td>
<td>Linear and Polynomial Regression</td>
<td>Reading: Scheiner &amp; Gurevitch pgs. 105-111; 183-194; Fry pgs. 127-170 Assignment 7: Modeling insect emergence</td>
</tr>
<tr>
<td>9</td>
<td>Multiple Regression and Nonlinear Regression</td>
<td>Reading: Scheiner &amp; Gurevitch pgs. 159-178, Daniels &amp; Latin. 2013. 1620-1625, Fry pgs. 1-34. Assignment 8: Determining the factors driving insect density II and modeling insect emergence</td>
</tr>
<tr>
<td>10</td>
<td>The Cell Means Model, Factorial Designs</td>
<td>Reading: Fry pgs. 41-80</td>
</tr>
<tr>
<td>11</td>
<td>Hierarchical Designs Error Structure, Fixed and random effects</td>
<td>Assignment 10: Determining the factors driving insect density cont’d</td>
</tr>
<tr>
<td>12</td>
<td>MANOVA &amp; ANCOVA</td>
<td>Assignment 11: Determining the factors driving insect density cont’d &amp; Models with qualitative and quantitative predictor variables</td>
</tr>
<tr>
<td>13</td>
<td>Repeated measures, Transforming Data,</td>
<td>Assignment 12: Models with multiple responses over time, Ladder of powers, other useful transformations</td>
</tr>
<tr>
<td>14</td>
<td>Nonparametric statistics</td>
<td>Assignment 13: Contingency data</td>
</tr>
<tr>
<td>15</td>
<td>Projects and Presentations</td>
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Supporting Documentation

ENTM 31200: Insect Chemical Ecology

Semesters Offered: Spring

Lecture Hours: 3 hrs

Credits: 3

Justification/Rationale: Chemical ecology is an interdisciplinary field between chemistry and biology that focuses on chemical interactions between organisms. It includes volatile and non-volatile signals that guide behaviors such as host- and mate-recognition and acceptance that is vital to the success of insects and all other living organisms dating back to the origins of life. A basic understanding of the structure and function of natural and synthetic products in ecology, training in current concepts and methods of chemical ecology, and the opportunity to explore how chemical ecologists apply this understanding to current topics of global importance are an essential part of undergraduate training in entomology.

Learning Outcomes:
ENTM 31200 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 31200 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes
1. Identify and practice the fundamental aspects of science: observation, explanation and investigation
2. Use observation and logic to develop falsifiable hypotheses and testable predictions
3. Quantitatively analyze data
4. Define, explain and defend the presence of ethical guidelines in the practice of science
5. Distinguish between and identify why a piece of written or oral communication is science or pseudoscience
6. Describe proximate and ultimate mechanisms governing insect behavior
7. Describe how insects coordinate responses to internal and external stimuli
8. Use of examples to explain how the behavior of an insect relates to its environment and other organisms
9. Describe the major causes and consequences of species diversity
10. Explain how energy and nutrients flow through different trophic levels within the context of food webs
11. Identify and describe the co-evolutionary processes that have shaped insect-host relationships
12. Identify and characterize emergent ecosystem functions (e.g., ecosystem services)
13. Identify and describe the role of anthropogenic influences in ecosystem structure and function
14. Discuss and provide examples of the interactions between insects and human cultures
15. Communicate how insects are used as models for the development of new problem solving approaches in materials, processes and systems
16. Discuss how multiple tactics are used in the implementation of IPM programs

**Assessment of learning outcomes**

Entomology discipline-specific learning outcomes will be assessed by a combination of exams, reflections, critiques of primary literature and oral presentations.

Contact for information:
Matthew Ginzel
494-9369
mginzel@purdue.edu
WSLR 228

John Couture
couture@purdue.edu
WSLR 224
Course syllabus:

**ENTM 31200: Insect Chemical Ecology**

**Instructors:** Matthew Ginzel and John Couture  
**Phone:** 494-3996  
**E-mail:** mginzel@purdue.edu; couture@purdue.edu  
**Office:** WSLR 228, WSLR 224  
**Office Hours:** TBD

**Credit Hours:** 3 credits (lecture: 3, lab:0)

**Course Description:** Chemical ecology is a field of study that deals with how chemical products affect and control intra- and interspecific interactions among living organisms. This three-credit course will provide: an overview of the structure and function of natural and synthetic products in ecology, training in current concepts and methods of chemical ecology, and the opportunity to explore applications of the current state of chemical ecology with regards to current topics of global importance (e.g., climate change, preservation of biodiversity, agricultural demands). Through lecture, discussing the primary literature, and hands-on, interactive demonstrations, we will explore the structure, origin and function of chemical intra- and interspecific interactions among organisms ranging from prokaryotes to humans.

**Prerequisites:** None

**Required Textbooks and other readings materials:**  
Weekly reading assignments of primary literature will replace a required textbook. Additional (non-required) reading material will be available on reserve at Life Sciences Library.

**Online support:** This course is supported by an on-line resource (Vista Blackboard) that provides a secure and convenient environment for disseminating course material. Students are able to view grades and download class material. This site also provides chat rooms and discussions forums where students can post comments or opinions and interact with classmates.

**Course Objectives:**  
By the end of this course student should:

1. Appreciate the history and scope of chemical ecology as a discipline.  
2. Understand the role of chemistry in the biology/ecology of plants and animals.  
3. Appreciate how chemical products influence processes at various levels of biological integration – from genes to ecosystems.  
4. Evaluate and critique primary literature on chemical ecology  
5. Recognize the application of insect chemical ecology in solving grand challenges in entomology

**Course Format:**  
Class will meet for three 50-minute sessions per week. The first meeting of each week will be dedicated to a content-driven lecture, the following period will be a discussion of the primary literature related to that topic, and the final meeting will focus on the application of the material toward understanding/solving societal grand challenges in entomology.
Student Assessment:

Exams (300 pts.)
There will be three exams throughout the course of the semester. These will be open-book, take-home exams, administered at the end of class on Monday and collected at the beginning of the class period on Friday. No comprehensive final exam will be given.

Discussions of the primary literature (300 pts.)
As a group, we will discuss current and/or seminal papers from the primary literature, and the article(s) will be provided to you on Blackboard Learn a minimum of one week prior to discussion. Each student, or a group of students, will be responsible for leading one discussion session. Also, each week you will be required to turn in a one-paragraph critique of one of the papers along with three discussion questions relating to each of the assigned papers. Further explanation of the grading and format of these discussions will be provided.

Reflections (150 pts.)
At the end of each application session (except when there are lab exercises), you will be required to turn in a reflection/journal entry on the topic covered that day. You can write about anything that stood out to you about that day's material (e.g., concepts you had difficulty understanding, or those you found particularly interesting, etc.). Reflections should be a paragraph in length, and will be worth 10 pts, and due to the instructor via email by midnight of that same day. The lowest two scores will be dropped.

Application Exercise Reports (150 pts.)
You will be required to write three reports related to the learning exercises. The short reports will be written in the journal format and include an abstract, an introduction that includes the hypothesis tested, materials and methods, discussion and references. Reports will be due in class one week after the completion of the lab exercise. Further explanation of the grading and format of these lab reports will be provided.

Presentation (100 pts.)
Throughout the course of the semester, students will give a short 10 to 12-minute oral presentation on the application of chemical ecology in addressing a societal grand challenge as it relates to the topic that week. The instructors will assist you in choosing a topic and developing an outline for your presentation.

Students will be evaluated on the following basis:

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<tr>
<th>Points</th>
<th>Description</th>
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<tbody>
<tr>
<td>300</td>
<td>3 Examinations (100 pts each)</td>
</tr>
<tr>
<td>300</td>
<td>Weekly critiques and discussion questions (15 @ 20 pts each)</td>
</tr>
<tr>
<td>150</td>
<td>Grand Challenges application reflection (10 @ 15 pts each)</td>
</tr>
<tr>
<td>150</td>
<td>Lab Exercise (3 @ 50 pts each)</td>
</tr>
<tr>
<td>100</td>
<td>Oral Presentation (100 pts)</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>1000</td>
<td>total</td>
</tr>
</tbody>
</table>

Grading Scale/Distribution:
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = <59%
Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.
### Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading assignment/discussion</th>
<th>Grand challenge application/reflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>History of chemical ecology</td>
<td>Hariston et al. 1960, Fraenkel 1964, Raguso et al. 2015,</td>
<td>Discussion: Future of chemical ecology</td>
</tr>
<tr>
<td>2</td>
<td>Plant-insect interactions: Terpenoids</td>
<td>Langenheim 1994</td>
<td>Volatiles: biocontrol and pest monitoring</td>
</tr>
<tr>
<td>3</td>
<td>Plant-insect interactions: Glucosinolates</td>
<td>Mithen 2001; Zenk and Juenger 2007</td>
<td>Breeding for health benefits (Presentation)</td>
</tr>
<tr>
<td>5</td>
<td>Plant-insect interactions: Alkaloids (EXAM 1 assigned)</td>
<td>Cordell 2013</td>
<td>Presentation</td>
</tr>
<tr>
<td>6</td>
<td>Plant-insect interactions: Other natural products</td>
<td>Zenk and Juenger 2007, Mithofer and Boland 2012 (cyanogenic glycosides, non-protein amino acids)</td>
<td>Presentation</td>
</tr>
<tr>
<td>8</td>
<td>Plant-insect interactions: Synthetic products</td>
<td>Berenbaum 1983, Becerra et al. 2009</td>
<td>Pollinator conservation</td>
</tr>
<tr>
<td>15</td>
<td>Biotechnology/ IPM (EXAM 3 assigned)</td>
<td>Goggin et al. 2015</td>
<td>Presentation</td>
</tr>
<tr>
<td>16</td>
<td>Knowledge gaps/future directions</td>
<td>Bindley Tour</td>
<td></td>
</tr>
</tbody>
</table>

### Supporting Documentation

**ENTM 32810: Practical Molecular Biology**
Semesters Offered: Spring

Lecture Hours: 2 hrs

Lab Hours: 3 hrs

Credits: 3

Justification/Rationale: The purpose of this course is to provide Insect Biology students with an in-depth molecular biology methods experience that builds on previous genetics courses and has the student utilize molecular tools to solve a problem using the scientific method and report their findings. This course unifies lessons from previous genetics, scientific communication and writing offerings to do this.

Learning Outcomes:
ENTM 32810 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 32810 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes
1. Identify and practice the fundamental aspects of science: observation, explanation and investigation
2. Use observation and logic to develop falsifiable hypotheses and testable predictions
3. Quantitatively analyze data
4. Explain the relationships presented in a dendrogram, and describe the various methods used to generate dendrograms in modern systematics
5. Describe the various ways in which the concept of species may be defined
6. Illustrate how genes, heredity and genetic variation in arthropods impact phenotype
7. Diagram the central dogma of biology
8. Syllogize how forward and reverse genetics, epigenetics, natural and artificial selection, Hardy-Weinberg principles and fitness costs apply to insect populations
9. Describe and apply technology and approaches employed historically and in modern insect genetics and genomics
10. Describe the nature and utility of data obtained from application of modern genetics and genomics tools used in insect biology.

Assessment of learning outcomes
Entomology discipline-specific learning outcomes will be assessed by a combination of exams, lab projects, lab notebooks, and oral presentations.

Contact for information:
Trevor Stamper
tstampe@purdue.edu
4-1262
Smith B9
Course syllabus:

ENTM 32810: Practical Molecular Biology

Credit Hours: 3.0
Class Time/Place: Lecture: Tuesday & Thursday 3:30-4:20. Lab: Tuesday & Thursday 4:30-5:50 pm.

Course Description: This course explores the fundamental use of molecular technology that may be used in entomological studies of population genetics, phylogenetics, or forensics. Specifically, an insect model is the focus of a semester-long research project that utilizes molecular taxonomy to identify species of unidentified samples. This project connects theory to practical methodologies as a model for how to answer biological questions with molecular techniques.

Prerequisite: AGRY 32000 or equivalent
Instructor: Dr. Trevor Stamper
Instructor Contact Information: Smith Hall, Room B-9
Office Hours: by appointment
Phone: 765-494-1262
e-mail: stampert@purdue.edu

Required Textbooks and other materials:

Additional readings, as assigned.

Course Objectives
1. Appreciate the scope and application of modern Forensic Biology and Entomology.
2. Appreciate the scope, diversity and utility of a variety of modern molecular typing techniques as they are used to answer Grand Challenges in our society.
3. Perform the primary technique used in current entomological and forensic molecular data generation:
4. DNA extraction and quantification, PCR, gel electrophoresis and sample purification
5. Perform molecular data analysis.

Student Assessment:
Students will be evaluated on the following basis:

The student will be evaluated on the following basis:

400 pts Examinations (100 pts each; final cumulative)
200 pts Lab Notebook
200 pts Species Identification Project
100 pts Alignment Project
---------
900 pts

Grading Scale/Distribution:
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

Examinations: There are four exams. The first three are focused on the material since the last examination, but the final examination is cumulative. Examinations come in two parts: take home and in-class components. The take home portion consists of multipart essay questions that require you link information learned in class, assigned reading and additional research together into a narrative that answers specific questions. Students complete the at-home portion on their own time, and submit it through the safe-assign feature in Blackboard. The in-class portion is more geared to technical questions, definitions and technique descriptions. Students will complete the in-class portion during class time (see the course schedule for dates).
Lab Notebook: Part of good science is good lab notebook upkeep. Each class will require some lab time, and each time you work in the lab, students need to keep an accurate record of what they are doing. The specifics of what this entails will be outlined in class lecture, or the student can ask the instructor if they are ever unsure. Each Friday a copy of that week’s lab notes is to be scanned and uploaded to blackboard. Lab notes are graded on a not turned in, ✓-, ✓, or ✓+, system. This will be recorded weekly and at the end of the semester, if there are any “not turned in” or zero spots in the student record, the student will receive no credit for that portion of the grade. Likewise, if the students ✓- grades outweigh their ✓, or ✓+ grades, the student will also receive no credit for the notebook.

Species Identification Project: Modern entomology and forensic biology involve the use of polymerase chain reaction (PCR) as well as other molecular tools, and these tools figure prominently in a wide variety of applications. Good molecular biology skills are essential to being a practicing entomologist or forensic biologist and this course is designed to allow students time to develop those skills. Each student will be presented with 10 unknown fly specimens along with a request to identify those specimens to species. Students will extract the DNA from those specimens, and over the course of the semester amplify the DNA using PCR techniques for the chosen locus of the current continental US carrion fly database. During this project you will also practice the use of positive and negative controls to ensure the quality of the products you produce. Students will sequence their products and then use molecular taxonomy to identify what species their flies likely are. This information will be presented as a poster indicating your confidence in species identification based upon your analysis. Late assignments will not be accepted.

Species Identification Projects projects are worth a total of 200 points, and these points will be divided as follows:

<table>
<thead>
<tr>
<th>Parts</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNA Extraction Report</td>
<td>50</td>
</tr>
<tr>
<td>PCR Report</td>
<td>50</td>
</tr>
<tr>
<td>QA/QC Report</td>
<td>50</td>
</tr>
<tr>
<td>Final Analysis (poster)</td>
<td>50</td>
</tr>
</tbody>
</table>

Alignment Project: Implicit in working with DNA technology is the analysis of DNA data at some level. In this class we will be working with fly sequence data. This data is presented to the student as it comes from the sequencer—as a raw electropherogram. Students partake in a project to transform the raw data into a form that is ready for analysis. This involves: editing raw code, BLAST checking for accuracy, aligning forward and reverse sequences to check for internal inconsistencies then performing a multiple specimen alignment and checking for codon alignment and errors. This work will be done out of the classroom, with students accessing blackboard modules as they progress through the assignment. More information about this assignment will be made available as we approach the project start date. All alignment assignments are due at the beginning of class on the scheduled due date. Late assignments will not be accepted. Alignment projects are worth a total of 100 points, and these points will be divided as follows:

<table>
<thead>
<tr>
<th>Parts</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Editing Raw Code</td>
<td>25</td>
</tr>
<tr>
<td>BLAST check</td>
<td>25</td>
</tr>
<tr>
<td>Forward/Reverse Alignment</td>
<td>25</td>
</tr>
<tr>
<td>Multiple Alignment</td>
<td>25</td>
</tr>
</tbody>
</table>

Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
<th>Lab</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Introduction</td>
<td>Butler 1</td>
<td>Basic Pipetting Skills 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Basic Genetics</td>
<td>Butler 2</td>
<td>DNA Extraction I</td>
<td>PCR Projects Assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dealing with Samples</td>
<td>Butler 4</td>
<td>DNA Extraction II</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Quality Assurance &amp; Quality Control</td>
<td>Butler 13</td>
<td>PCR Temp Optimization I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>DNA Extraction &amp; Quantitation</td>
<td>Butler 5 &amp; 6</td>
<td>PCR Temp Optimization II</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>PCR Fundamentals</td>
<td>Butler 7</td>
<td>Species ID Project</td>
<td>Editing Raw Code Assigned</td>
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<td>Exam 1</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>1</td>
<td>Advanced PCR</td>
<td>TBA</td>
<td>Species ID Project</td>
<td></td>
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<tr>
<td></td>
<td>2</td>
<td>DNA separation &amp; Detection</td>
<td>Butler 9</td>
<td>Species ID Project</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>STR markers</td>
<td>Butler 8</td>
<td>Species ID Project</td>
<td>Editing Raw Code Due</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>STR genotyping &amp; Detection</td>
<td>Butler 10</td>
<td>Species ID Project</td>
<td>BLAST assigned</td>
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<tr>
<td>7</td>
<td>2</td>
<td>STR Statistics</td>
<td>Butler Appendix 3</td>
<td>Species ID Project</td>
<td>DNA Extraction Report due</td>
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<tr>
<td>8</td>
<td>1</td>
<td>DNA Databases</td>
<td>Butler 12</td>
<td>Species ID Project</td>
<td>Alignment I assigned</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>STR Challenges</td>
<td>Butler 14</td>
<td>Species ID Project</td>
<td></td>
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<tr>
<td>10</td>
<td>1</td>
<td>Lineage Markers</td>
<td>Butler 16</td>
<td>Species ID Project</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>Species identification</td>
<td>Dizon et al. 2001 &amp; Butler 15</td>
<td>Species ID Project</td>
<td></td>
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<tr>
<td>12</td>
<td>1</td>
<td>Molecular Taxonomy</td>
<td>TBA</td>
<td>Species ID Project</td>
<td>Alignment I due</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Molecular Taxonomy</td>
<td>TBA</td>
<td>Species ID Project</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>Molecular Taxonomy</td>
<td>TBA</td>
<td>Species ID Project</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>Building Reference Databases I</td>
<td>TBA</td>
<td>Species ID Project</td>
<td></td>
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<tr>
<td>16</td>
<td>1</td>
<td>Sampling Strategies</td>
<td>Wells &amp; Stevens 2008</td>
<td>Species ID Project</td>
<td>Alignment II due</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>Prep for sequencing</td>
<td>Species ID Project</td>
<td>PCR Report Due</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>Sequencing Intro</td>
<td>TBA</td>
<td>Species ID Project</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>Next Gen Sequencing</td>
<td>TBA</td>
<td>Species ID Project</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Thanksgiving Break</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>the future: bioinformatics</td>
<td>Species ID Project</td>
<td>QA/QC Report Due</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>the future: bioinformatics</td>
<td>Poster Presentations</td>
<td>Final Analysis Poster Presentations</td>
<td></td>
</tr>
</tbody>
</table>
Supporting Documentation

ENTM 35300: Insecticides & Environment

Semesters Offered: Spring

Lecture Hours: 2 hrs/Lab 2 hrs

Credits: 3

Justification/Rationale: Competence in the area of insecticides, relevant policies and procedures is an important Insect Biology curriculum outcome. This course will be required for the Insect Biology Major. The course may be useful for students in agriculture production, health or environmental sciences and policy majors. It addresses discipline-specific outcomes in the areas of toxicology; cell biology, physiology & biochemistry; human-insect interactions; genetics & genomics; philosophy & practice of science; and ecology.

Learning Outcomes:
ENTM 35300 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 35300 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes

1. Quantitatively analyze data.
2. Evaluate the scientific process as to accuracy, precision, and error sources and mitigation.
3. Define, explain and defend the presence of ethical guidelines in the practice of science.
4. Distinguish between and identify why a piece of written or oral communication is science or pseudoscience.
5. Describe the major causes and consequences of species diversity.
6. Explain how energy and nutrients flow through different trophic levels within the context of food webs res.
7. Demonstrate an understanding of how organisms, organ systems, organs, cells and bio-molecules carry out essential functions in insects.
8. Identify and describe the structure and principal functions of the insect integument, alimentary canal, nervous system, tracheal system, fat body, reproductive system, and circulatory system.
9. Define the term “hormone” and identify the principal hormones controlling the progress of insect postembryonic development, growth, and reproduction.
10. Describe how insects are exposed to insecticides and the physiological, physical and behavioral barriers to intoxication.
11. Predict selectivity, efficacy, and environmental fate of insecticides based on mode of action and chemical properties.
12. Explain how formulation and application methods influence the effectiveness of insecticides while managing and mitigating the risks associated with their use.
13. Comprehend insecticide labels and direct others in the calculation, mixing and application of insecticides.
14. Discuss the insecticide discovery, development, registration and regulatory processes.
15. Discuss how multiple tactics are used in the implementation of IPM programs.
17. Describe how recombinant DNA technologies are relevant to pest management.

**Assessment of learning outcomes**
Entomology discipline-specific learning outcomes will be met and assessed through lecture, readings, laboratory experiments and demonstrations, team presentations and assignments (see syllabus, below). Exams will provide additional assessment. Where possible, outcomes are taught using active learning techniques.

**Contact for information:**
Jonathan Neal
765.494.4594
jneal@purdue.edu
SMTH 127E
Course syllabus:

ENTM 35300: Insecticides & Environment

Instructors: Jonathan Neal and Michael Scharf
Contact jneal@purdue.edu or mscharf@purdue.edu

Credit Hours: 3 credits (lecture)

Course Description: The study of insecticides, their interactions with biological organisms and the environment, relevant policies to minimize adverse economic and environmental outcomes including protection of human health and safety, and current controversies. Topics include insecticide mode of action, development of insecticide resistance, environmental fate, human health effects, risk assessment and management, regulations. Laboratories provide practical demonstrations, training and exploration of current controversies.

Prerequisites: None

Required Textbooks and other readings materials:

Course Objectives:
1. Communicate to the public about insecticide issues including risk, best practices for management and use.
2. Apply principles of toxicology including dose response, target sites, differential toxicity, resistance.
3. Evaluate environmental hazards, their management and mitigation.
4. Interpret and implement insecticide label instructions.
5. Explain how Risk Assessment and Management is implemented in the US to protect human health and safety and balance economic and environmental risks.

Student Assessment:
Student performance will be evaluated on the following basis:
400 points Examinations (4 @ 100 points each)
100 points Assignments (3 Total)
100 points Presentation (1 @ 100 points)
100 points Lab Reports (10 @ 10 points each)

Grading Scale/Distribution:
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.
## Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fundamental principles of toxicology, &amp; application to policy</td>
<td>Worker Protection/Risk Management</td>
</tr>
<tr>
<td>2</td>
<td>Pharmacodynamics/ Formulations</td>
<td>Uptake, polarity demonstration</td>
</tr>
<tr>
<td>3</td>
<td>Hazard Assessment &amp; Dose Response</td>
<td>LD 50 Lab</td>
</tr>
<tr>
<td>4</td>
<td>Insecticide Modes of Action</td>
<td>Neurophysiological effects of insecticides demonstration</td>
</tr>
<tr>
<td>5</td>
<td>Insecticide Modes of Action</td>
<td>Repellents, antifeedants hormone analogs</td>
</tr>
<tr>
<td>6</td>
<td>Insecticide Resistance</td>
<td>Resistance Lab</td>
</tr>
<tr>
<td>7</td>
<td>Trends in Insecticide Use, Selectivity, Target Site Insensitivity, Differential Metabolism</td>
<td>BT, Differential toxicity</td>
</tr>
<tr>
<td>8</td>
<td>Problematic insecticides: case studies</td>
<td>Problematic insecticides: case studies</td>
</tr>
<tr>
<td>9</td>
<td>Insecticides in Agriculture</td>
<td>Insecticides formulations and application</td>
</tr>
<tr>
<td>10</td>
<td>Insecticides in urban environments</td>
<td>Pest control devices</td>
</tr>
<tr>
<td>11</td>
<td>Insecticides in public health</td>
<td>Field Trip to State Chemist</td>
</tr>
<tr>
<td>12</td>
<td>Insecticides in Organic and Green Pest Control, Efficacy, Toxicity</td>
<td>Organic Insecticides</td>
</tr>
<tr>
<td>13</td>
<td>Principles of environmental toxicology &amp; Insecticides in the environment</td>
<td>Environmental Fate</td>
</tr>
<tr>
<td>14</td>
<td>Risk Characterization, Risk Management &amp; Insecticide Labels</td>
<td>Risk Assessment and Management/ Labels and Interpretation</td>
</tr>
<tr>
<td>15</td>
<td>Students Presentations, Case Studies of Environmental Problems and Resolution</td>
<td>Students Presentations, Case Studies of Environmental Problems and Resolution</td>
</tr>
<tr>
<td>16</td>
<td>FINAL EXAM *</td>
<td></td>
</tr>
</tbody>
</table>
Supporting Documentation

ENTM 39300: Insect Biology Practicum

Semesters Offered:  Fall, Spring, Summer

Laboratory Hours:  1 hrs

Credits:  0.5

Justification/Rationale:  Entomology is a highly integrated science that encompasses a broad range of expertise and applications of knowledge. Not surprisingly, faculty working in entomology pursue a variety of academic enterprises across all three areas of the land grant mission. However, undergraduate students in entomology have little opportunity to become familiar with the diversity of things Entomologists do, prospective career paths available to them, or how these career paths are linked to grand societal challenges. By engaging students in embedded experiential learning, this course will provide students with insights into the day to day workings of academic entomology, familiarize them with the range of things entomologists do and provide them with an opportunity for mentored reflection that will allow them to explore the discipline of entomology and understand how entomological endeavors fit within the larger context of societal grand challenges.

Learning Outcomes:
ENTM 39300 will NOT be nominated for inclusion on a University Foundational Core or CoA Core course list.

Entomology discipline-specific learning outcomes
1. Communicate how insects are used as models for the development of new problem solving approaches in materials, processes and systems

Assessment of learning outcomes
All students enrolled in ENTM 39300 will be required to convene at the end of each 8 week session and provide an oral presentation overviewing some aspect of the mentor’s program and its linkage to societal grand challenges.

Contact for information:
Douglas S. Richmond
494-0399
drichmond@purdue.edu
SMTH 105C
Course syllabus:

ENTM 39300: Insect Biology Practicum

Instructor: Entomology Faculty
Phone:
E-mail:
Office:
Office Hours:

Credit Hours: 0.5 credits (Independent Study)

Course Description: The course is designed to provide imbedded programmatic experiences for undergraduate students. It will introduce students to the breadth of the discipline of Entomology by engaging them at a programmatic level. This will be accomplished by incorporating them into laboratory meetings, research, extension or teaching activities and through discussions with the faculty mentor (instructor) about the goals and motivations driving their weekly research, extension or teaching activities and how these activities address societal grand challenges. All students enrolled in ENTM 39800 will be required to convene at the end of each 8 week session and provide an oral presentation overviewing some aspect of the mentor’s program and its linkage to societal grand challenges.

Co- or Prerequisites: None

Required Textbooks and other readings materials: None

Course Objectives:
1. Survey and experience the scope of the discipline of Entomology.
2. Provide students with an opportunity to make relevant connections to their own academic, professional and personal motivations and goals in Entomology.
3. Understand procedures and approaches useful for research, teaching and extension in Entomology.
4. Communicate to others how societal grand challenges are being addressed through the lens of the mentor’s program.

Student Assessment:
Students will be evaluated based on a combination of the following criteria:
- Attendance & participation at lab meetings
- Student Journal
- Written and oral overview of the program being observed

Students will be required to keep a journal detailing the activities of the lab they are embedded within and provide a detailed written and oral explanation (presentation) of one or more of the projects being conducted and how the work relates to societal grand challenges. The oral presentation will be given at the end of the 8 week term for an audience consisting of student peers that are also enrolled in ENTM 39300, and the faculty mentors.

Grading Scale/Distribution: S/U
Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.

**Class Schedule:** TBD, but a typical schedule might look like this:

<table>
<thead>
<tr>
<th>Week</th>
<th>Meeting</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>2</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>3</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>4</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>5</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>6</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>7</td>
<td>Lab meeting</td>
<td>Journal</td>
</tr>
<tr>
<td>8</td>
<td>Group meeting</td>
<td>Oral Presentation, Written Summary</td>
</tr>
</tbody>
</table>
Supporting Documentation

ENTM 40100 Addressing Grand Challenges through Insect Biology

Semesters Offered: Spring

Lecture Hours: 1 hr

Credits: 1

Justification/Rationale: Course Justification: The curriculum for Insect Biology majors is designed to prepare graduates to meet societal grand challenges in a number of important areas such as food security, human diseases and environmental perturbations. An essential component of this curriculum is a course that (i) challenges students to organize and reflect on the knowledge and skills they gained, and prepare for the next steps; and (ii) brings together their education, experiences and interests on a path towards a future career. To this end, this course will engage students in examining several grand challenges and determining: what is the challenge? what do we already know about the problem?, what gaps in knowledge or implementation of solutions exist? What role insect biology plays in addressing these grand challenges?

Learning Outcomes:
ENTM 40100 will NOT be nominated for inclusion on a University Foundational Core or CoA Core course list.

A. Insect Biology discipline-specific learning outcomes
   (1) Discuss and provide examples of the interactions between insects and human cultures
   (2) Communicate how insects are used as models for the development of new problem solving approaches in materials, processes and systems
   (3) Distinguish between and identify why a piece of written or oral communication is science or pseudoscience

B. Assessment of learning outcomes
   Insect Biology discipline-specific learning outcomes
   Entomology discipline-specific learning outcomes will be assessed using a combination of weekly assignments, case studies, panel discussions, and presentations.

Contact for information:
Dieudonné Baributsa
494-8713
Course syllabus:

ENTM 40100: Addressing Grand Challenges through Insect Biology

Instructors: Dieudonné Baributsa, Steve Yaninek, Matt Ginzel
Emails: dbaribut@purdue.edu, yaninek@purdue.edu, mginzel@purdue.edu
Phone: Baributsa 4-8713, Yaninek 4-4554, Ginzel 4-9369
Office Hours: By appointment (or just stop by)

Credit Hours: 1

Course Description: Students will be challenged to link and apply their knowledge to societal grand challenges by identifying the challenges, understanding the current state of knowledge, identifying gaps, and synthesizing or implementing possible solutions.

Prerequisites: None

Required Textbooks and other materials
There is no required textbook, but readings (TBD) will be assigned for each class period.

Course Objectives
1. Show how the accumulated knowledge and experiences offered to Insect Biology majors can be applied to address Grand Challenges
2. Demonstrate where capstone projects and grand challenges intersect
3. Learn about roles insect biologist play in addressing grand challenges, and explore future career options
4. Develop skills in communication, critical thinking and teamwork

Student Assessment:
Students will be evaluated on the following basis:

400 pts Weekly Assignments (8 @ 50 points each)
400 pts Classroom presentations:
   Student case study and panel discussions (3 @ 100 points each)
   Capstone and grand challenges (100 pts)
200 pts Class participation (8 sessions @ 25 points each)

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1000 pts Total

Grading Scale/Distribution:
A = 90+% , B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

The course will meet for two 50 min class periods [time and day to be decided] each week for the first 8 weeks of the semester. This schedule is subject to change. Any updates will be announced in class and on Blackboard.

Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.
Lecture Topics:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction, insect biology curriculum and grand challenges</td>
</tr>
<tr>
<td>2</td>
<td>Grand challenges reviewed: sustainable agriculture</td>
</tr>
<tr>
<td>3</td>
<td>Student case study and panel discussion: sustainable agriculture</td>
</tr>
<tr>
<td>4</td>
<td>Grand challenges reviewed: vector-borne diseases</td>
</tr>
<tr>
<td>5</td>
<td>Student case study and panel discussion: vector-borne diseases</td>
</tr>
<tr>
<td>6</td>
<td>Grand challenges reviewed: invasive species</td>
</tr>
<tr>
<td>7</td>
<td>Student case study and panel discussion: invasive species</td>
</tr>
<tr>
<td>8</td>
<td>Capstones and grand challenges: making a connection</td>
</tr>
</tbody>
</table>

Assignments

Date Class Topic/Assignments

Week 1 Introduction & Overview
- Prepare a brief personal biography about your time as a Purdue student (what do you want others, e.g., future employers, admissions officers, to know about you and your interests as an Insect Biology major?). Include classes you took outside of the major that you found to be particularly noteworthy (these can be interesting or boring classes), and relevant extracurricular experiences, e.g., part-time work, internships, study abroad, social clubs, leadership activities, sports activities and anything else you feel was relevant to your education.

Week 2 Grand challenges reviewed: sustainable agriculture
- Choose a grand challenge related to sustainable agriculture and describe where insect biology fits as a discipline and contributes in addressing the issue. Provide your information sources.

Week 3 Student case study and panel discussion: sustainable agriculture
- As a team, prepare a written position statement that reflects the interests of your assigned stakeholder group, and be prepared to defend your position as part of a panel discussion.

Week 4 Grand challenges reviewed: vector-borne diseases
- Choose a grand challenge related to vector borne diseases and describe where insect biology fits as a discipline and contributes in addressing the issue. Provide your information sources.

Week 5 Student case study and panel discussion: vector-borne diseases
- As a team, prepare a written position statement that reflects the interests of your assigned stakeholder group, and be prepared to defend your position as part of a panel discussion.

Week 6 Grand challenges reviewed: invasive species
- Choose a grand challenge related to invasive species and describe where insect biology fits as a discipline and contributes in addressing the issue. Provide your information sources.

Week 7 Student case study and panel discussion: invasive species
- As a team, prepare a written position statement that reflects the interests of your assigned stakeholder group, and be prepared to defend your position as part of a panel discussion.
Week 8 Capstones and grand challenges: making a connection

- Describe how and where your capstone project aligns with a particular grand challenge. This outline will become the basis for a short presentation each student will make in class.

Student Case Study Panel Discussions
Students will be organized into three teams and assigned case studies around each of the three broad grand challenge topics – sustainable agriculture, vector-borne diseases and invasive species. The case studies will be based on real or fictitious situations. Students will be provided with adequate background information about each case study and draft, in teams, their position on how to best address the situation. The teams will represent various stakeholders, such as government agencies, the private sector, advocacy groups, farmers, consumers, etc. This exercise will encourage critical thinking, expression of opinions, team work and consensus building, and illustrate the complexity of grand challenges and their possible solutions. Teams will be required to write short documents stating their position and the reasoning behind their choices before each panel discussion or debate during weeks 3, 5 and 7. The instructors will follow the groups to insure participation and contribution of each team member.

Classroom Presentations
Students will make oral presentations four times during the course. The first three presentations will be as members of teams presenting and defending positions in student case study and discussion panels scheduled for weeks 3, 5 and 7. The fourth and final presentation will be done by each student individually and will describe where his/her proposed capstone project aligns with a grand challenge.

Class Participation
Students must attend lectures and actively participate each class period to receive maximum participation points. Asking and answering questions, and contributing to other in-class activities will be used as measures of participation.

Class Assignments
Class assignments are due by the beginning of class on the dates indicated. Late assignments will automatically lose half of their point value, and will not be accepted more than one week late. All assignments must be typed and presented in a neat and concise manner. Complete sentences (no text messaging scripts) and proper grammar are expected so proofread your work before turning it in. Class assignments are subject to change with advance notice.
Supporting Documentation

ENTM 41000: Applied Insect Biology

Semesters Offered: Fall

Lecture Hours: 2 hrs

Credits: 2

Justification/Rationale: Applied Entomology involves the study of insects that benefit or harm humans, domestic animals, crops, structures and natural resources. Human civilization has been awash in a sea of insects since its beginning and insects still permeate almost every aspect of our society; food, water, shelter, health, recreation, transportation and communication. The ability to identify insects, understand their biology, and manage their populations is essential for maintaining and advancing global food and energy security, and human and animal health and well-being, while minimizing the impacts of management on environmental integrity.

Learning Outcomes:
ENTM 41000 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 41000 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes
1. Construct and compare common models useful for understanding population dynamics.
2. Explain how energy and nutrients flow through different trophic levels within the context of food webs.
3. Identify and describe the role of anthropogenic influences in ecosystem structure and function.
4. Define the term “hormone” and identify the principal hormones controlling the progress of insect postembryonic development, growth, and reproduction.
5. Describe how insects are exposed to insecticides and the physiological, physical and behavioral barriers to intoxication.
6. Discuss and provide examples of the interactions between insects and human cultures.
7. Discuss the insecticide discovery, development, registration and regulatory processes.
8. Apply decision-making models and understanding of insect biology to the practice and development of policy surrounding management and conservation of insects.
9. Discuss how multiple tactics are used in the implementation of IPM programs.
10. Morphologically identify arthropods to the level of class, insects to the level of order and common insects to the level of family.
11. Demonstrate understanding of phenotypic traits associated with insect populations and their relevance to insecticide resistance and vector competence.
12. Describe how recombinant DNA technologies are relevant to pest management.
Assessment of learning outcomes

Entomology discipline-specific learning outcomes will be assessed using a combination of 4 in-class quizzes, a mid-term exam, and a final exam.

Contact for information:
Douglas S. Richmond
494-0399
drichmond@purdue.edu
SMTH 105C
Course syllabus:

ENTM 41000: Applied Insect Biology

Instructor: Rick Foster  
Phone: 494-9572  
E-mail: rfoster@purdue.edu  
Office: SMTH B1b  
Office Hours: TBD

Instructor: Cliff Sadof  
Phone: 494-5983  
E-mail: csadof@purdue.edu  
Office: SMTH B3b  
Office Hours: TBD

Instructor: Gary Bennett  
Phone: 494-4564  
E-mail: gbennett@purdue.edu  
Office: SMTH 105B  
Office Hours: TBD

Instructor: Doug Richmond  
Phone: 494-0399  
E-mail: drichmond@purdue.edu  
Office: SMTH 105C  
Office Hours: TBD

Credit Hours: 2 credits (lecture)

Course Description: A semester long course focusing on the identification, biology and management of insects associated with global food and energy security, human and animal health and well-being. The impact of insect pest management on environmental integrity will be emphasized.

Prerequisites: None

Required Textbooks and other readings materials:  

Course Objectives:  
1. Provide students with a systematic approach for identifying insects impacting global food and energy security, human and animal health and well-being, and environmental integrity.  
2. Familiarize students with the biology of insect pests.

**Student Assessment:**
Student performance will be evaluated on the following basis:

<table>
<thead>
<tr>
<th></th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 pts Quizzes</td>
<td>4 @ 30 pts each</td>
</tr>
<tr>
<td>100 pts Mid-term Exam</td>
<td></td>
</tr>
<tr>
<td>100 pts Final Examination</td>
<td></td>
</tr>
<tr>
<td><strong>------------</strong></td>
<td>320 pts total</td>
</tr>
</tbody>
</table>

**Grading Scale/Distribution:**
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

**Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.**

**Class Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics Covered</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course Introduction: Human-insect relationships and the historical basis of</td>
<td>Pedigo &amp; Rice 13-33</td>
</tr>
<tr>
<td></td>
<td>integrated pest management</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Insect Classification: Elements of classification, types of insect pests</td>
<td>Pedigo &amp; Rice 81-135</td>
</tr>
<tr>
<td>3</td>
<td>Insect Life Cycles: Insect growth and reproduction, general models of the</td>
<td>Pedigo &amp; Rice 147-174</td>
</tr>
<tr>
<td></td>
<td>insect development and seasonal cycles</td>
<td>Quiz #1</td>
</tr>
<tr>
<td>4</td>
<td>Insect Ecology: Ecological role of insect pests, trophic relationships,</td>
<td>Pedigo &amp; Rice 177-208</td>
</tr>
<tr>
<td></td>
<td>population regulatory factors</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Insect populations: Surveillance and Sampling, sampling units, techniques</td>
<td>Pedigo &amp; Rice 213-246</td>
</tr>
<tr>
<td></td>
<td>and programs</td>
<td></td>
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<tr>
<td>6</td>
<td>Decision Models: Economic and aesthetic injury levels, thresholds and</td>
<td>Pedigo &amp; Rice 255-284</td>
</tr>
<tr>
<td></td>
<td>implementation</td>
<td>Quiz #2</td>
</tr>
<tr>
<td>7</td>
<td>Ecological management: cultural and physical factors</td>
<td>Pedigo &amp; Rice 335-365</td>
</tr>
<tr>
<td>8</td>
<td>Host plant Resistance: Insect-host relationships, mechanisms of resistance,</td>
<td>Pedigo &amp; Rice 453-471</td>
</tr>
<tr>
<td></td>
<td>factors mediating expression</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>MID-TERM EXAM</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Biological Control of Insects: Biological control agents, the practice of</td>
<td>Pedigo &amp; Rice 311-332 and 435-450</td>
</tr>
<tr>
<td></td>
<td>biological control, biopesticides</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Chemical Insecticides: Classes, formulations, toxicity, laws and regulation</td>
<td>Pedigo &amp; Rice 369-432</td>
</tr>
<tr>
<td>12</td>
<td>Genetic control of insects: Sterile-insect technique, other genetic</td>
<td>Pedigo &amp; Rice 525-548</td>
</tr>
<tr>
<td></td>
<td>techniques</td>
<td>Quiz #3</td>
</tr>
<tr>
<td>13</td>
<td>Modifying insect development &amp; behavior: IGR’s, pheromones, repellents,</td>
<td>Pedigo &amp; Rice 493-522</td>
</tr>
<tr>
<td></td>
<td>integration with other tactics</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Biotechnology in Pest Management: GMO’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrated Pest Management: Concepts of integration, development of IPM programs</td>
<td>Pedigo &amp; Rice 551-573 Quiz #4</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>15</td>
<td>FINAL EXAM</td>
<td></td>
</tr>
</tbody>
</table>
Supporting Documentation

ENTM 41001 Insects of Urban Landscapes

Semesters Offered: Fall

Laboratory Hours: 2 hrs

Credits: 1

Justification/Rationale: Laboratory experiences provide students with first-hand opportunities to explore the concepts and the methods used by scientists in this discipline. The laboratories associated with Applied Entomology are intended to provide students with a systematic approach for identifying insect pests and beneficial species, familiarize students with the biology of these insects and help students develop intuition and a deeper understanding of insect management concepts by applying them to new situations. In doing so, students will develop critical and quantitative thinking, experimental and data analysis skills. Students will also learn to use scientific equipment, estimate statistical errors and recognize systematic errors, develop reporting skills, practice collaborative problem solving, exercise curiosity and creativity by designing a procedure to test a hypothesis, and develop appreciation for the role of experimentation in applied entomology. Students seeking degrees in turfgrass science and landscape management require specialized experiences with pest and beneficial insects associated with these systems.

Learning Outcomes:
ENTM 41001 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 41001 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes
1. Identify and practice the fundamental aspects of science: observation, explanation and investigation.
2. Use observation and logic to develop falsifiable hypotheses and testable predictions.
3. Quantitatively analyze data.
4. Evaluate the scientific process as to accuracy, precision, and error sources and mitigation.
5. Comprehend insecticide labels and direct others in the calculation, mixing and application of insecticides.
6. Discuss and provide examples of the interactions between insects and human cultures.
7. Morphologically identify arthropods to the level of class, insects to the level of order and common insects to the level of family.

Assessment of learning outcomes
Entomology discipline-specific learning outcomes will be assessed using a combination of 4 laboratory practical exams and 12 assignments designed to reinforce diagnostic concepts.
Contact for information:
Douglas S. Richmond
494-0399
drichmond@purdue.edu
SMTH 105C
Course syllabus:

**ENTM 41001: Insects of Urban Landscapes**

**Instructor:** Cliff Sadof  
**Phone:** 494-5983  
**E-mail:** csadof@purdue.edu  
**Office:** SMTH B3b  
**Office Hours:** TBD

**Instructor:** Doug Richmond  
**Phone:** 494-0399  
**E-mail:** drichmond@purdue.edu  
**Office:** SMTH 105C  
**Office Hours:** TBD

**Credit Hours:** 1 credit (laboratory)

**Course Description:** A semester long laboratory course focusing on the identification and biology of pest and beneficial insects associated with turfgrass and ornamental plants and experimentation in applied entomology.

**Co- or Prerequisites:** ENTM 41000

**Required Textbooks and other readings materials:**
A smart phone capable of taking photos

**Course Objectives:**
1. Provide a systematic approach for identifying pest and beneficial insects associated with turfgrass & ornamental plants.
2. Familiarize students with the biology of pest and beneficial insects associated with turfgrass & ornamental plants.
3. Engage students in the design, implementation, analysis, summary and critique of a semester-long group research project or experiment in economic entomology.

**Student Assessment:**
Student performance will be evaluated on the following basis:

<table>
<thead>
<tr>
<th>Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>Laboratory Practical Exams (100 pts each)</td>
</tr>
<tr>
<td>360</td>
<td>Laboratory Assignments (12 @ 30 points each)</td>
</tr>
<tr>
<td>880</td>
<td>total</td>
</tr>
</tbody>
</table>

**Grading Scale/Distribution:**
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

**Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.**
### Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Laboratory Topics Covered</th>
<th>Diagnostic Concepts: Plant injury first half, Specimen identification second half</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Setting-Up an IPM Experiment</td>
<td>When is a plant not normal? Leaf distortion, discoloration</td>
</tr>
<tr>
<td>2</td>
<td>Establishing a field site</td>
<td>Defoliators</td>
</tr>
<tr>
<td>3</td>
<td>Applying Insecticides</td>
<td>Gall formers and scale insects</td>
</tr>
<tr>
<td>4</td>
<td>Laboratory Practical Exam 1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collecting Data</td>
<td>Leaf miners and shoot feeders</td>
</tr>
<tr>
<td>6</td>
<td>Data Management</td>
<td>Trunk feeders</td>
</tr>
<tr>
<td>7</td>
<td>Data Analysis &amp; Summary</td>
<td>Root feeders</td>
</tr>
<tr>
<td>8</td>
<td>Laboratory Practical Exam 2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Internal and External Morphology</td>
<td>Insect parts that chew, suck and lay eggs in plants</td>
</tr>
<tr>
<td>10</td>
<td>Taxonomic Survey of Turfgrass &amp; Ornamental Insects -Coleoptera</td>
<td>Beetle mandibles: How and why adult leaf injury differs from larvae. Heartwood vs phloem feeders; Herbivores vs predators</td>
</tr>
<tr>
<td>11</td>
<td>Taxonomic Survey of Turfgrass &amp; Ornamental Insects -Lepidoptera</td>
<td>Caterpillar feeding: Injury and mandible size. Following the web and frass trail,</td>
</tr>
<tr>
<td>12</td>
<td>Laboratory Practical Exam 3</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Taxonomic Survey of Turfgrass &amp; Ornamental Insects -Hymenoptera</td>
<td>Symphyta vs Aprocrita Herbivory, stinging, sociality, parasitism</td>
</tr>
<tr>
<td>14</td>
<td>Taxonomic Survey of Turfgrass &amp; Ornamental Insects -Hemiptera</td>
<td>Herbivores vs predators Mouthpart structure and feeding guild</td>
</tr>
<tr>
<td>15</td>
<td>Taxonomic Survey of Turfgrass &amp; Ornamental Insects -Diptera</td>
<td>Adaptations for biting and sucking mammals, consuming insects and feeding on and inside of plants.</td>
</tr>
<tr>
<td>16</td>
<td>Final Practical Exam</td>
<td></td>
</tr>
</tbody>
</table>

**Notes on Diagnostic Concepts**

During the first half of the semester students will be shown the different types of plant injury on plant specimens both inside the lab and in the landscape. Students will be asked to use a smartphone app, called Mixable, to take a photo of representative examples during the week to reinforce the concept. During the second half of the semester, students will draw representative specimens to illustrate associations between insect morphology types of injury they cause to plants, people or property.
Supporting Documentation

ENTM 41002 Insects of Agricultural Crops

Semesters Offered: Fall

Laboratory Hours: 2 hrs

Credits: 1

Justification/Rationale: Applied Entomology involves the study of insects that benefit or harm humans, domestic animals, and crops, and laboratory experiences provide students with first-hand opportunities to explore the concepts and the methods used by scientists in this discipline. The laboratories associated with Applied Entomology are intended to provide students with a systematic approach for identifying insect pests and beneficial species, familiarize students with the biology of these insects and help students develop intuition and a deeper understanding of insect management concepts by applying them to new situations. In doing so, students will develop critical and quantitative thinking, experimental and data analysis skills. Students will also learn to use scientific equipment, estimate statistical errors and recognize systematic errors, develop reporting skills, practice collaborative problem solving, exercise curiosity and creativity by designing a procedure to test a hypothesis, and develop appreciation for the role of experimentation in science. Students seeking degrees in pest management fields, horticulture, or agronomy will benefit from the practical, hands-on laboratory sessions.

Learning Outcomes:
ENTM 41002 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 41002 for inclusion on the CoA Additional Mathematics and/or Science Selectives List.

Entomology discipline-specific learning outcomes
1. Identify and practice the fundamental aspects of science: observation, explanation and investigation.
2. Use observation and logic to develop falsifiable hypotheses and testable predictions.
3. Quantitatively analyze data.
4. Evaluate the scientific process as to accuracy, precision, and error sources and mitigation.
5. Predict selectivity, efficacy, and environmental fate of insecticides based on mode of action and chemical properties
6. Explain how formulation and application methods influence the effectiveness of insecticides while managing and mitigating the risks associated with their use
7. Comprehend insecticide labels and direct others in the calculation, mixing and application of insecticides.
8. Apply decision-making models and understanding of insect biology to the practice and development of policy surrounding management and conservation of insects
9. Discuss and provide examples of the interactions between insects and human cultures.
10. Morphologically identify arthropods to the level of class, insects to the level of order and common insects to the level of family.

**Assessment of learning outcomes**
Entomology discipline-specific learning outcomes will be assessed using a combination of laboratory practical exams, 12 laboratory assignments and a final practical exam.

**Contact for information:**
Rick Foster
494-9572
rfoster@purdue.edu
SMTH B1b
Course syllabus:

**ENTM 41002: Insects of Agricultural Crops**

**Instructor:** Rick Foster  
**Phone:** 494-9572  
**E-mail:** rfoster@purdue.edu  
**Office:** SMTH B1b  
**Office Hours:** TBD

**Credit Hours:** 1 credit (laboratory)

**Course Description:** A semester long laboratory course focusing on the identification, biology, and management of pests of agricultural crops, identification of natural enemies, and a basic understanding of the scientific method.

**Co- or Prerequisites:** ENTM 41000

**Required Textbooks and other readings materials:**
A smart phone capable of taking photos

**Course Objectives:**
1. Familiarize students with the identification, biology and management of pest insects associated with agricultural crops.
2. Familiarize students with the identification of natural enemies of pest species and how they can be used in pest management.
3. Engage students in the design, implementation, analysis, summary and critique of a group research experiment in applied entomology

**Student Assessment:**
Student performance will be evaluated on the following basis:

<table>
<thead>
<tr>
<th>Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>Laboratory Practical Exams (100 pts each)</td>
</tr>
<tr>
<td>120</td>
<td>Laboratory Assignments (12 @ 30 points each)</td>
</tr>
<tr>
<td>200</td>
<td>Final Laboratory Practical Exam (200 pts)</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>520</td>
<td>total</td>
</tr>
</tbody>
</table>

**Grading Scale/Distribution:**
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

**Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.**
## Class Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Laboratory Topics Covered</th>
<th>Assignment Due Next Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Setting-Up an IPM Experiment; Experimental design; Randomization; Replication</td>
<td>Students will develop a plot plan for the experiment – 10 points</td>
</tr>
<tr>
<td>2</td>
<td>Reading and understanding pesticide labels; Sprayer calibration</td>
<td>Students will calculate amounts of each pesticide and the amount of water to be used in each treatment – 20 points</td>
</tr>
<tr>
<td>3</td>
<td>Establishment of cabbage experiment at Meigs Farm. Demonstration of use of spray equipment</td>
<td>Students will determine what personal protective equipment will be required for each insecticide applied – 10 points</td>
</tr>
<tr>
<td>4</td>
<td>Application of insecticides to cabbage experiment at Meigs Farm</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Collection of data in cabbage experiment at the Meigs Farm</td>
<td>Students will develop tables summarizing the results of the data collected – 20 points</td>
</tr>
<tr>
<td>6</td>
<td>Data Analysis</td>
<td>Students will use data from experiment to prepare report for cabbage experiment suitable for Arthropod Management Tests – 60 points</td>
</tr>
<tr>
<td>7</td>
<td>Insect Pests of Corn</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Insect Pests of Soybean</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Insect Pests of Wheat and Alfalfa</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Laboratory Practical 1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Insect Pests of Tree Fruits</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Insect Pests of Small Fruits</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Laboratory Practical 2</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Insect Pests of Cucurbits, Fruiting Vegetables, and Cruciferous Crops</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Insect Pests of Potato, Legumes, Leaf Crops, and Root Crops</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Final Practical Exam</td>
<td></td>
</tr>
</tbody>
</table>
Supporting Documentation

ENTM 49310 Insect Biology Capstone Experience

Semesters Offered:  Fall, Spring, Summer

Laboratory Hours:  4-8 hrs

Credits:  2-4

Justification/Rationale:  Baccalaureate degree plans of study in the College of Agriculture at Purdue University must include a capstone course or experience.  The capstone experience aims to challenge students to integrate their accumulated knowledge and technical and social skills in order to identify and solve a problem relevant to issues encountered by professionals in their chosen discipline, and to communicate the results of their efforts to their peers. In order to meet these goals, the faculty of the Department of Entomology, after fully re-evaluating the undergraduate curriculum, has decided to re-design and the existing capstone experience. In this proposal, the existing two semester Entomology capstone experience (ENTM 49200 and ENTM 49300) will be reorganized to accommodate student efforts to conduct a capstone project during the summer between years 3 and 4, or during year 4. This expanded timeline will provide students with a more flexible opportunity to plan, conduct and adjust the capstone project and maximize the benefits of the experience.

Learning Outcomes:
ENTM 49310 will NOT be nominated for inclusion on a University Foundational Core.  We nominate ENTM 49310 for inclusion in the list of CoA Capstone courses.

UCC embedded learning outcomes
(1) Creative Thinking

Assessment of learning outcomes
UCC embedded learning outcomes
(1) Creative Thinking: All students enrolled in ENTM 49310 will be required to work with a faculty mentor to design and conduct a research, extension or teaching project that demonstrates their ability to integrate their accumulated knowledge and technical and social skills in order to identify and solve a problem relevant to Entomology. Students capacity to combine or synthesize existing ideas, images, or expertise in original ways and think, react, and work in imaginative, innovative or divergent ways will be assessed through their role in designing, implementing, and interpreting their capstone project.

Contact for information:
Douglas S. Richmond
494-0399
drichmond@purdue.edu
SMTH 105C
Course syllabus:

ENTM 49310: Insect Biology Capstone Experience

Instructor: Entomology Faculty
Phone: 
E-mail: 
Office: 
Office Hours: 

Credit Hours: 2-4 credits (Independent Study)

Course Description: This course is an experiential meant to familiarize students with the options and procedures associated with the Entomology capstone experience and provide students with an avenue for fulfilling their capstone requirement by conducting a capstone project. Students may use a research, extension or teaching project to meet this requirement. Although the capstone project may build on or extend a previously conducted undergraduate research project, independent study, or study abroad, students enrolled in ENTM 49310 must conduct their capstone project in a manner that is independent from any other project for which credit will be awarded or for which they will be paid as an employee. Students may enroll in ENTM 49310 and conduct the capstone project at any time during the last 2 years of study.

Co- or Prerequisites: None

Required Textbooks and other readings materials: None

Course Objectives: In completing this course, students will demonstrate their ability to integrate their accumulated knowledge and technical and social skills in order to identify and solve a problem relevant to Entomology. Students completing this course will:

(1) Conduct a capstone project and analyze or interpret the information generated.

Student Assessment:
1) Students understanding of the work and its implications for the science of Entomology.
2) Level of commitment to the project.

Student understanding of the work and its implications.................................100 pts
Creativity.............................................................................................................................100 pts
Commitment to the project .........................................................................................100 pts
Total ................................................................................................................................300 pts

Grading Scale/Distribution:
A = 90+% , B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.

Supporting Documentation
ENTM 49390 Insect Biology Capstone Forum

Semesters Offered: Spring

Laboratory Hours: 2 hrs

Credits: 1

Justification/Rationale: Baccalaureate degree plans of study in the College of Agriculture at Purdue University must include a capstone course or experience. The capstone experience aims to challenge students to integrate their accumulated knowledge and technical and social skills in order to identify and solve a problem relevant to issues encountered by professionals in their chosen discipline, and to communicate the results of their efforts to their peers. This course will provide students with a formal venue for communicating the results of their capstone project to their peers in both oral and written form.

Learning Outcomes:
ENTM 49390 will NOT be nominated for inclusion on a University Foundational Core. We nominate ENTM 49310 for inclusion in the list of CoA Capstone courses.

UCC embedded learning outcomes
(1) Written Communication
(2) Oral Communication

Assessment of learning outcomes
UCC embedded learning outcomes
(1) Written Communication: All students enrolled in ENTM 49390 will be required to provide a written report that communicates the objectives, methods and findings of their capstone project to their peers. This written report will used to evaluate the written communication outcome.

(2) Oral Communication: All students enrolled in ENTM 49390 will be required to provide 12 minute oral presentation that communicates the objectives, methods and findings of their capstone project to their peers during the capstone forum. This Oral presentation will used to evaluate the oral communication outcome.

Contact for information:
Douglas S. Richmond
494-0399
drichmond@purdue.edu
SMTH 105C
Course syllabus:

ENTM 49390: Insect Biology Capstone Forum

Instructor: Entomology Faculty
Phone: 
E-mail: 
Office: 
Office Hours:

Credit Hours: 1 credit (Independent Study)

Course Description: Baccalaureate degree plans of study in the College of Agriculture at Purdue University must include a capstone course or experience. The capstone experience aims to challenge students to integrate their accumulated knowledge and technical and social skills in order to identify and solve a problem relevant to issues encountered by professionals in their chosen discipline, and to communicate the results of their efforts to their peers. This course is an experiential course that provides students with an avenue for communicating the results of their capstone project to their peers. Students may enroll in ENTM 49390 during the semester in which they intend to transmit the result of their capstone project. Students will be required to report these results through two avenues—an oral presentation, given during the capstone forum, and a written report or scientific poster.

Co- or Prerequisites: None

Required Textbooks and other readings materials: None

Course Objectives: In completing this course, students will demonstrate their ability to integrate their accumulated knowledge and technical and social skills in order to identify and solve a problem relevant to Entomology, by communicating the results of their efforts to their peers through an oral presentation and a written report or scientific poster.

Student Assessment:
Quality and organization of the oral presentation.................................100 pts
Quality and organization of the written report or poster..........................100 pts
Total ........................................................................................................200 pts

Grading Scale/Distribution:
A = 90+%, B = 80-89%, C = 70-79%, D = 60-69%, F = 59% or less

Policy statements pertaining to Attendance, Safety and Emergencies, Academic Integrity, Diversity and Inclusion, and Students with Disabilities will be included in all syllabi.
Supporting Documents: D. CURRICULAR CHANGES

Retire Entomology Minor
Students enrolled in the Entomology Minor prior to Fall 2017 will be allowed to complete the minor under the existing plan of study. Students may no longer enroll in the Entomology Minor after the end of Summer Semester, 2017.

New Insect Biology Minor

Justification: This new Insect Biology Minor replaces the Entomology Minor and is updated to reflect changes to course offerings. This minor provides a focused study in insect biology that can complement a diversity of student majors.

Proposed New Insect Biology Minor

Title: Insect Biology
Degree Level: Minor
Minor Code: INSB
Advisor's Name: Jonathan Neal
Advisor's Phone: 765.494.4594
Advisor's Email: jneal@purdue.edu
Information
Department: ENTM (Departmental permission is not required to enroll in this minor.)
Credit Hours: 15
Description: Concentrated Study of Insect Biology

REQUIRED COURSES:
(2) ENTM 20600 General Entomology
(1) ENTM 20700 General Entomology Laboratory

Twelve additional credits must be completed from the following courses:

SELECTIVE LIST:
3 Cr. ENTM 10500 Insect Friend and Foe
3 Cr. ENTM 21000 Introduction to Insect Behavior
4 Cr. ENTM 25300 Insect Physiology and Biochemistry
3 Cr. ENTM 31100 Insect Ecology
3 Cr. ENTM 31200 Insect Chemical Ecology
3 Cr. ENTM 32810 Practical Molecular Biology
3 Cr. ENTM 33500 Introduction to Insect Identification
3 Cr. ENTM 35100 Bee Biology And Bee Keeping
3 Cr. ENTM 35300 Insecticides & Environment
2 Cr. ENTM 41000 Applied Insect Biology
1 Cr. ENTM 41001 Insects of Urban Landscapes
1 Cr. ENTM 41002 Insects of Agricultural Crops
3 Cr. ENTM 44100 Forest Entomology
3 Cr. ENTM 44300 Arthropods and Diseases Of Turfgrass
3 Cr. ENTM 44600 Integrated Plant Health Management For Ornamental Plants
3 Cr. ENTM 51000 Insect Pest Management
3 Cr. ENTM 52500 Medical Entomology
Insect Biology Major: Supporting Document

1. Redesign of the Insect Biology curriculum
   - Justification and Rationale
   - 8 Semester Plan of Study
   - alignment with COA core and UCC Foundational and Embedded Outcomes
   - alignment with Statewide General Education Transfer Core
   - Insect Biology major checklist
   - Insect Biology Selectives list

Justification/Rationale
As an integrative science, Insect Biology should be responsive to advances in the life, environmental and agricultural sciences. Our new curriculum will prepare graduates to meet societal grand challenges by providing the skills necessary to pursue careers or advanced training in the following broad challenge areas:

- **Biodiversity**: Conservation, Climate Change, Pollinator Protection, Ecosystem Services, Invasive Species
- **Global Food and Energy Security**: Plant protection, Livestock animal health and well-being, Biofuels
- **Human Health and Well-being**: Insect borne diseases of humans, Parasites and pests of humans, Veterinary entomology

The curriculum will provide progressive learning experiences that establishes and builds on fundamental knowledge in the biological and physical sciences while challenging students to develop superior written and oral communication skills and providing them with active learning opportunities in all dimensions of insect biology. Superior critical thinking skills will be developed through exposure to the concepts of experimental design and analysis and a series of immersive experiences designed to provide students with real-world scientific perspectives and skills.
### MAJOR: Insect Biology

**Bachelor of Science in Insect Biology: 120 CR**

#### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 AGR 10100</td>
<td>4 BIOL 11100</td>
</tr>
<tr>
<td>Introduction to the College of Agriculture and Purdue University</td>
<td>Fundamentals of Biology II</td>
</tr>
<tr>
<td>0.5 AGR 11700</td>
<td>3 CHM 11200</td>
</tr>
<tr>
<td>Introduction to Entomology Programs</td>
<td>General Chemistry II</td>
</tr>
<tr>
<td>1 ENTM 10100</td>
<td>3 ENTM 21000</td>
</tr>
<tr>
<td>Insect Biology and Societal Grand Challenges</td>
<td>Introduction to Insect Behavior</td>
</tr>
<tr>
<td>4 BIOL 11000</td>
<td>3 COM 11400 or COM 21700</td>
</tr>
<tr>
<td>Fundamentals of Biology I</td>
<td></td>
</tr>
<tr>
<td>3 CHM 11100</td>
<td>1st Year Composition Selective</td>
</tr>
<tr>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>2 ENTM 10200</td>
<td></td>
</tr>
<tr>
<td>The Practice of Science</td>
<td></td>
</tr>
<tr>
<td>3 Calculus Selective</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Total Credit Hours 16-17</td>
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</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Third Semester</th>
<th>Fourth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ENTM 20600</td>
<td>4 ENTM 25300</td>
</tr>
<tr>
<td>General Entomology</td>
<td>Insect Physiology &amp; Biochemistry</td>
</tr>
<tr>
<td>1 ENTM 20700</td>
<td>3 ENTM 31100</td>
</tr>
<tr>
<td>General Entomology Lab</td>
<td>Insect Ecology</td>
</tr>
<tr>
<td>3 ENTM 20100</td>
<td>3 Humanities or Social Science Selective</td>
</tr>
<tr>
<td>Scientific and Technical Communication</td>
<td></td>
</tr>
<tr>
<td>3 STAT 30100</td>
<td>3 Economics Selective</td>
</tr>
<tr>
<td>Elementary Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>3 PHYS 21400</td>
<td>3 Elective</td>
</tr>
<tr>
<td>The Nature of Physics</td>
<td></td>
</tr>
<tr>
<td>3 UCC Humanities Selective</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Total Credit Hours 16</td>
</tr>
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</table>

#### Junior Year

<table>
<thead>
<tr>
<th>Fifth Semester</th>
<th>Sixth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 AGRY 32000</td>
<td>3 BTNY 35000</td>
</tr>
<tr>
<td>Genetics</td>
<td>Biotechnology in Agriculture</td>
</tr>
<tr>
<td>1 AGRY 32100</td>
<td>3 ENTM 31200</td>
</tr>
<tr>
<td>Genetics lab</td>
<td>Insect Chemical Ecology</td>
</tr>
<tr>
<td>3 ENTM 30100</td>
<td>3 ENTM 35300</td>
</tr>
<tr>
<td>Experimentation &amp; Analysis</td>
<td>Insecticides &amp; Environment</td>
</tr>
<tr>
<td>4 ENTM 33500</td>
<td>1 ENTM 39300</td>
</tr>
<tr>
<td>Introduction to Insect Identification</td>
<td>Insect Biology Practicum</td>
</tr>
<tr>
<td>1 ENTM 39300</td>
<td>3 Science Selective 1</td>
</tr>
<tr>
<td>Insect Biology Practicum</td>
<td></td>
</tr>
<tr>
<td>3 UCC STS Selective</td>
<td>3 Elective</td>
</tr>
<tr>
<td>15</td>
<td>Total Credit Hours 16</td>
</tr>
</tbody>
</table>

#### Senior Year

<table>
<thead>
<tr>
<th>Seventh Semester</th>
<th>Eighth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ENTM 41000</td>
<td>1 ENTM 40100</td>
</tr>
<tr>
<td>Applied Insect Biology</td>
<td>Addressing Grand Challenges</td>
</tr>
<tr>
<td>1 Applied Insect Biology Laboratory Selective2</td>
<td>Through Insect Biology</td>
</tr>
<tr>
<td>2 ENTM 49310</td>
<td>2 ENTM 49310</td>
</tr>
<tr>
<td>Insect Biology Capstone Experience</td>
<td>Insect Biology Capstone Experience</td>
</tr>
<tr>
<td>3 Elective</td>
<td>1 ENTM 49390</td>
</tr>
<tr>
<td>3 Elective</td>
<td>Insect Biology Capstone Forum</td>
</tr>
<tr>
<td>4 Elective</td>
<td></td>
</tr>
<tr>
<td>3 Elective</td>
<td></td>
</tr>
<tr>
<td>14-15</td>
<td>Total Credit Hours 13</td>
</tr>
</tbody>
</table>

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1. Insect Biology Directed Science Selectives
2. See list of Applied Insect Biology Laboratory Selectives
### College of Agriculture and University Core Alignment

<table>
<thead>
<tr>
<th>CoA Core Requirements (Credits)</th>
<th>UCC Foundational Outcome (Courses)</th>
<th>Insect Biology Core Alignment Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Orientation (1)</td>
<td></td>
<td>AGR 10100 and AGR 11700</td>
</tr>
<tr>
<td>Biological Sciences (8)</td>
<td>Science (2)</td>
<td>BIOL 11000 and BIOL 11100</td>
</tr>
<tr>
<td>Calculus (3)</td>
<td>Quantitative Reasoning (1)</td>
<td>MATH 16010</td>
</tr>
<tr>
<td>Statistics (3)</td>
<td></td>
<td>STAT 30100</td>
</tr>
<tr>
<td>Science, Technology &amp; Society (3)</td>
<td>Science, Tech. &amp; Society (1)</td>
<td>UCC STS Selective</td>
</tr>
<tr>
<td>Additional Mathematics and Sciences (4)</td>
<td></td>
<td>Major Requirements</td>
</tr>
<tr>
<td>First Year Composition (3-4)</td>
<td>Written Communication (1)</td>
<td>1st Year Composition Selective</td>
</tr>
<tr>
<td>Fundamentals of Speech Communication (3)</td>
<td>Oral Communication (1)</td>
<td>COM 11400 or COM 21700</td>
</tr>
<tr>
<td>Additional Written and Oral Communication (3)</td>
<td></td>
<td>ENTM 20100;</td>
</tr>
<tr>
<td>Economics (3)</td>
<td>Behavioral &amp; Social Science (1)</td>
<td>CoA Economics Selective</td>
</tr>
<tr>
<td>Humanities (3)</td>
<td>Humanities (1)</td>
<td>CoA HSS Selective</td>
</tr>
<tr>
<td>Other Humanities &amp; Social Sciences (6)</td>
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<td>CoA HSS Selectives</td>
</tr>
<tr>
<td>Humanities &amp; Social Sciences 30000+ (3)</td>
<td></td>
<td>CoA HSS Selective (30000+)</td>
</tr>
<tr>
<td>International Understanding (9)</td>
<td></td>
<td>CoA International Understanding Selectives</td>
</tr>
<tr>
<td>Multicultural Awareness (3)</td>
<td></td>
<td>CoA Multicultural Awareness Selective</td>
</tr>
</tbody>
</table>

**Total CoA = 58-59 Credits**  
**Total UCC = 10 Courses**

1CoA International Understanding & Multicultural Awareness requirements are met by wisely selecting communications, humanities & social science selectives. See CoA CHSS courses.xlsx for guidance.

### Embedded Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication (Levels 2 and 3)</td>
<td>ENTM 49390 Insect Biology Capstone Forum</td>
</tr>
<tr>
<td>- Written Communication</td>
<td>ENTM 49390 Insect Biology Capstone Forum</td>
</tr>
<tr>
<td>- Oral Communication</td>
<td>ENTM 49390 Insect Biology Capstone Forum</td>
</tr>
</tbody>
</table>

### Ways of Thinking

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Critical Thinking</td>
<td>ENTM 30100 Experimentation &amp; Analysis</td>
</tr>
<tr>
<td>- Practical Thinking</td>
<td>ENTM 4100X Applied Insect Biology Laboratory</td>
</tr>
<tr>
<td>- Creative Thinking</td>
<td>ENTM 49310 Insect Biology Capstone Experience</td>
</tr>
</tbody>
</table>

### Interpersonal Skills & Intercultural Knowledge

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Interpersonal Skills</td>
<td>CoA Communication Selective (20000+) or other</td>
</tr>
<tr>
<td>- Intercultural Knowledge</td>
<td>CoA International Understanding &amp; Multicultural Awareness Selective</td>
</tr>
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</table>

### General Education Transfer Core

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Cultures – Humanities</td>
<td>UCC Human Cultures: Humanities Selective</td>
<td>3</td>
</tr>
<tr>
<td>Human Cultures – Social Sciences</td>
<td>CoA Economics Selective</td>
<td>3</td>
</tr>
<tr>
<td>Information Literacy</td>
<td>STAT 30100</td>
<td>3</td>
</tr>
<tr>
<td>Science Selective</td>
<td>BIOL 11000</td>
<td>4</td>
</tr>
<tr>
<td>Science Selective</td>
<td>CHM 11100 and CHM 11200</td>
<td>6</td>
</tr>
<tr>
<td>Science, Technology and Society</td>
<td>UCC STS Selective</td>
<td>3</td>
</tr>
<tr>
<td>Written Communication</td>
<td>1st Year Composition Selective</td>
<td>3-4</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>COM 11400 or COM 21700</td>
<td>3</td>
</tr>
<tr>
<td>Quantitative Reasoning</td>
<td>MATH 16010</td>
<td>3</td>
</tr>
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</table>

**Total 31-32**
<table>
<thead>
<tr>
<th>Orientation Requirements (1 credit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>____ 0.5  AGR 10100  Introduction to the CoA and Purdue University</td>
</tr>
<tr>
<td>____ 0.5  AGR 11700  Introduction to Entomology Programs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required ENTM Courses (39 credits)</th>
</tr>
</thead>
<tbody>
<tr>
<td>____ 1  ENTM 10100  Insect Biology and Societal Grand Challenges</td>
</tr>
<tr>
<td>____ 2  ENTM 10200  The Practice of Science</td>
</tr>
<tr>
<td>____ 2  ENTM 20600  General Entomology</td>
</tr>
<tr>
<td>____ 1  ENTM 20700  General Entomology Lab</td>
</tr>
<tr>
<td>____ 3  ENTM 21000  Introduction to Insect Behavior</td>
</tr>
<tr>
<td>____ 4  ENTM 25300  Insect Physiology &amp; Biochemistry</td>
</tr>
<tr>
<td>____ 3  ENTM 30100  Experimentation &amp; Analysis</td>
</tr>
<tr>
<td>____ 3  ENTM 31100  Insect Ecology</td>
</tr>
<tr>
<td>____ 3  ENTM 31200  Insect Chemical Ecology</td>
</tr>
<tr>
<td>____ 4  ENTM 33500  Introduction to Insect Identification</td>
</tr>
<tr>
<td>____ 3  ENTM 35300  Insecticides &amp; Environment</td>
</tr>
<tr>
<td>____ 0.5  ENTM 39300  Insect Biology Practicum</td>
</tr>
<tr>
<td>____ 0.5  ENTM 39300  Insect Biology Practicum</td>
</tr>
<tr>
<td>____ 0.5  ENTM 39300  Insect Biology Practicum</td>
</tr>
<tr>
<td>____ 0.5  ENTM 39300  Insect Biology Practicum</td>
</tr>
<tr>
<td>____ 1  ENTM 40100  Addressing Grand Challenges Through Insect Biology</td>
</tr>
<tr>
<td>____ 2  ENTM 41000  Applied Insect Biology</td>
</tr>
<tr>
<td>____ 2  ENTM 49310  Insect Biology Capstone Experience</td>
</tr>
<tr>
<td>____ 2  ENTM 49310  Insect Biology Capstone Experience</td>
</tr>
<tr>
<td>____ 1  ENTM 49390  Insect Biology Capstone Forum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insect Biology Selectives (4 credits)</th>
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</thead>
<tbody>
<tr>
<td>____ 1  ENTM 4100X  Applied Insect Biology Laboratory Selective¹</td>
</tr>
<tr>
<td>____ 3  Directed Science Selective²</td>
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</table>

<table>
<thead>
<tr>
<th>Other Departmental/Program Course Requirements (33 credits)</th>
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<tbody>
<tr>
<td>____ 4  BIOL 11000  Fundamentals of Biology I</td>
</tr>
<tr>
<td>____ 4  BIOL 11100  Fundamentals of Biology II</td>
</tr>
<tr>
<td>____ 3  CHM 11100  General Chemistry I</td>
</tr>
<tr>
<td>____ 3  CHM 11200  General Chemistry II</td>
</tr>
<tr>
<td>____ 3  PHYS 21400  The Nature of Physics</td>
</tr>
<tr>
<td>____ 3  STAT 30100  Elementary Statistical Methods</td>
</tr>
<tr>
<td>____ 3  AGRY 32000  Genetics</td>
</tr>
<tr>
<td>____ 1  AGRY 32001  Genetics Laboratory</td>
</tr>
<tr>
<td>____ 3  BTNY 35000  Biotechnology in Agriculture</td>
</tr>
<tr>
<td>Course</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Calculus Selective</td>
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<tr>
<td>UCC STS Selective</td>
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<tr>
<td><strong>Communication Requirements (9-10 credits)</strong></td>
</tr>
<tr>
<td>1st Year Composition Selective</td>
</tr>
<tr>
<td>COM 11400 or COM 21700</td>
</tr>
<tr>
<td>Writing and Presentation</td>
</tr>
<tr>
<td>ENTM 20100</td>
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<tr>
<td><strong>Humanities &amp; Social Science Requirements (15 credits)</strong></td>
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<tr>
<td>Economics Selective</td>
</tr>
<tr>
<td>Humanities or Social Science Selective</td>
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<tr>
<td>Humanities or Social Science Selective</td>
</tr>
<tr>
<td>Humanities or Social Science Selective (30000+)</td>
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<tr>
<td>UCC Humanities Selective</td>
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<tr>
<td><strong>Electives (18-19 credits)</strong></td>
</tr>
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1. See list of Applied Insect Biology Laboratory Selectives
2. See list of Insect Biology Science Selectives
### Insect Biology Directed Science Selectives (3 credits required)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>AGRY 48000</td>
<td>Plant Genetics*</td>
</tr>
<tr>
<td>3</td>
<td>AGRY 51100</td>
<td>Population Genetics*</td>
</tr>
<tr>
<td>3</td>
<td>AGRY 52000</td>
<td>Principles and Methods of Plant Breeding*</td>
</tr>
<tr>
<td>2</td>
<td>AGRY 57200</td>
<td>Molecular Cytogenetics*</td>
</tr>
<tr>
<td>1</td>
<td>AGRY 57200</td>
<td>Molecular Cytogenetics Laboratory*</td>
</tr>
<tr>
<td>3</td>
<td>ANSC 51100</td>
<td>Population Genetics*</td>
</tr>
<tr>
<td>2</td>
<td>ANSC 51400</td>
<td>Animal Biotechnology*</td>
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<td>3</td>
<td>BCHM 22100</td>
<td>Analytical Biochemistry I*</td>
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<tr>
<td>3</td>
<td>BCHM 36100</td>
<td>Molecules*</td>
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<tr>
<td>3</td>
<td>BCHM 46300</td>
<td>Macromolecular Machines*</td>
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<tr>
<td>4</td>
<td>BIOL 22100</td>
<td>Introduction to Microbiology*</td>
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<tr>
<td>2</td>
<td>BIOL 28000</td>
<td>Genetics and Molecular Biology*</td>
</tr>
<tr>
<td>1</td>
<td>BIOL 28100</td>
<td>Laboratory in Genetics and Molecular Biology*</td>
</tr>
<tr>
<td>3</td>
<td>BIOL 48100</td>
<td>Eukaryotic Genetics*</td>
</tr>
<tr>
<td>3</td>
<td>BTNY 42000</td>
<td>Plant Cellular and Developmental Biology*</td>
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<tr>
<td>4</td>
<td>CHM 22400</td>
<td>Introductory Quantitative Analysis*</td>
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<td>3</td>
<td>CHM 25500</td>
<td>Organic Chemistry I*</td>
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<td>3</td>
<td>ENTM 32810</td>
<td>Practical Molecular Biology*</td>
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<td>2</td>
<td>IT 22600</td>
<td>Biotechnology Laboratory I</td>
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<tr>
<td>2</td>
<td>IT 22700</td>
<td>Biotechnology Laboratory II*</td>
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<tr>
<td>4</td>
<td>PHYS 22100</td>
<td>General Physics II*</td>
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### Applied Insect Biology Laboratory Selectives (1 credit required)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>1</td>
<td>ENTM 41001</td>
<td>Insects of Urban Landscapes*</td>
</tr>
<tr>
<td>1</td>
<td>ENTM 41002</td>
<td>Insects of Agricultural Crops*</td>
</tr>
</tbody>
</table>

* Co-requisite or Prerequisite required. Prerequisites are sometimes fulfilled by courses required in the Insect Biology curriculum
Agricultural Faculty
Document No. VI, 2016-17
November 8, 2016

Department of Forestry and Natural Resources
Proposed Course and Curricular Changes

A. COURSE TO BE DELETED

FNR 10300 – Introduction to Environmental Conservation

Credit Hours: 3.00. Introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. For all students interested in an introductory natural resources or environmental science elective. Typically offered Fall and Spring.

Justification: This course will be replaced with FNR 12500.

B. COURSES TO BE ADDED

FNR 12500 – Environmental Science and Conservation

Credit Hours: 3.00. (NRES 12500, EAPS 12500, AGRY 12500) Introduction to environmental science and conservation includes topics in ecological principles, conservation and natural resource management, human impacts on the environment, toxic waste disposal, climate change, energy, air and water pollution, environmental geology, and geologic hazards. Typically offered Fall and Spring.

C. COURSES TO BE CHANGED

1) From:
   FNR 55800 – Digital Remote Sensing and GIS

Credit Hours: 3.00. Advanced course in the use of digital remote sensing techniques and geographic information systems for renewable natural resources management. Emphasizes the physical principles behind the digital remote sensing of vegetative features, present-day instrument technology, spatial data processing and analysis algorithms, error analysis and accuracy assessment procedures, and multi-source data integration. Provides hands-on experience with forest canopy modeling, atmospheric modeling, image processing, and GIS software on microcomputer and workstation platforms. Typically offered Fall.

To:
   FNR 55800 – Remote Sensing Analysis and Applications
Credit Hours: 3.00. Advanced course in the use of remote sensing techniques emphasizing the physical principles behind the remote sensing of vegetative features, present-day instrument technology, spatial data processing and analysis algorithms, error analysis and accuracy assessment procedures, and multi-source data integration. Provides hands-on experience with forest canopy modeling, atmospheric modeling, image processing, and GIS software on microcomputer and workstation platforms. Typically offered Spring.

Justification: The title of the course has been updated to reflect the changing field (i.e., everything is digital now) and the course will now be taught in spring.

2) Course prerequisite changes

From:
FNR 41800 Prop Wood Related Mfg
   Prerequisites: Undergraduate level FNR 31100 Minimum Grade of D-

To:
FNR 41800 Prop Wood Related Mfg
   Prerequisites: Undergraduate level FNR 31110 Minimum Grade of D-

Justification: Change update prerequisite to new course number (FNR 31100 to 31110).

From:
FNR 42500 Secondary Wood Prod Mfg
   Prerequisites: Undergraduate level FNR 30100 Minimum Grade of D- and
               Undergraduate level FNR 41800 Minimum Grade of D-

To:
FNR 42500 Secondary Wood Prod Mfg
   Prerequisites: Undergraduate level FNR 30110 Minimum Grade of D- and
               Undergraduate level FNR 41800 Minimum Grade of D-

Justification: Change update prerequisite to new course number (FNR 30100 to 30110).
D. CURRICULAR CHANGES

1) **Fisheries and Aquatic Sciences, Forestry and Wildlife majors** (Updated 8-semester plans are attached)

   Change ENGL 10600 – First Year Composition (4 credits) to English Composition (ENGL 10600 or ENGL 10800) (3-4 credits)
   Add 0-1 credits of unrestricted electives in Semester 8
   **Justification:** Change to reflect reduction in CoA core requirements for English composition.

   Drop FNR 10300 – Introduction to Environmental Conservation (3 credits)
   Add FNR 12500 – Environmental Science and Conservation (3 credits)
   **Justification:** Updates these majors to the renamed and renumbered FNR 12500 course.

2) **Sustainable Biomaterials major** (Updated 8-semester plans are attached)

   Change ENGL 10600 – First Year Composition (4 credits) to English Composition (ENGL 10600 or ENGL 10800) (3-4 credits)
   Add 0-1 credits of unrestricted electives in Semester 8
   **Justification:** Change to reflect reduction in CoA core requirements for English composition.

   Drop FNR 10300 – Introduction to Environmental Conservation (3 credits)
   Add FNR 12500 – Environmental Science and Conservation (3 credits)
   **Justification:** Updates these majors to the renamed and renumbered FNR 12500 course.

   Replace Physics selection to PHYS 22000 – General Physics
   **Justification:** All other courses listed on the physics selective list are not accessible to our students due to prerequisites or other requirements.

   Remove FNR 30200 – Global Sustainability Issues from sustainability selective list.
   **Justification:** It is a required class for the major (Sem. 8); it never should have been listed in the selective list.

3) **Urban Forestry minor**

   Add ENTM 20600 – General Entomology (2 credits) and ENTM 20700 – General Entomology Laboratory (1 credit) to list of selectives.
   **Justification:** This course gives students additional flexibility in their minor requirements.
4) **Furniture Design minor**

   Drop:
   
   FNR 31100
   FNR 41900
   FNR 48400

   Add:
   
   FNR 31110 – Structure, Identification, and Properties of Woody Biomaterials
   FNR 41910 – Furniture Product Development and Strength Design
   FNR 48410 – Sustainable Furniture Design for CNC Manufacturing

   **Justification:** Changes course list to update numbers and names of currently offered courses.

5) **Wood Products Manufacturing Technology minor**

   Drop:
   
   FNR 30100
   FNR 31100
   IT 10400
   IT 11400

   Add:
   
   FNR 30110 – Sustainable Forest Products Manufacturing
   FNR 31110 – Structure, Identification, and Properties of Woody Biomaterials
   TLI 11100 – Gateway to Technology Leadership and Innovation
   TLI 23500 – Introduction to Lean and Sustainable Systems

   **Justification:** Changes course list to update numbers and names of currently offered courses.
Supporting Documentation

Semesters Offered: Spring and Fall

Lecture/Lab Hours: Class 3

Credits: 3

Course Title: Environmental Science and Conservation

A) Justification
The course is cross-listed as Introduction to Environmental Conservation (FNR 10300) and Introduction to Environmental Science (EAPS 11300/NRES 29000/AGRY 29000) in the course catalog. We have taught the course cross-listed across all four departments for three semesters. To make course registration simpler for the students and blackboard function easier and more efficient for the faculty, the instructors want to change the name and course number. The name should be changed to Environmental Science and Conservation and the course number should be FNR 12500/EAPS 12500/NRES 12500/AGRY 12500. This will make the enrollment process uniform across the departments. The course content will not change from how it has been taught for the past three semesters.

B) Nominations, outcomes and assessment

i. Applicable to University Core Curriculum
This course ☒ will ☐ will not be nominated for inclusion on University Foundational Core. If no, skip to section ii.

<table>
<thead>
<tr>
<th>Foundational Learning Outcomes</th>
<th>Check all that apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Written Communication</td>
<td>☐</td>
</tr>
<tr>
<td>2. Information Literacy</td>
<td>☐</td>
</tr>
<tr>
<td>3. Oral Communication</td>
<td>☐</td>
</tr>
<tr>
<td>4. Science</td>
<td>☐</td>
</tr>
<tr>
<td>5. Science, Technology and Society</td>
<td>☒</td>
</tr>
<tr>
<td>6. Mathematics/Quantitative Reasoning</td>
<td>☐</td>
</tr>
<tr>
<td>7. Human Cultures: Humanities</td>
<td>☐</td>
</tr>
<tr>
<td>8. Human Cultures: Behavioral &amp; Social Sciences</td>
<td>☐</td>
</tr>
</tbody>
</table>

ii. Applicable to College of Agriculture Core
This course ☒ will ☐ will not be nominated for inclusion on College of Agriculture Core. If no, skip to section iii.

<table>
<thead>
<tr>
<th>College of Agricultural Core</th>
<th>Check all that apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mathematics and Sciences</td>
<td>☒</td>
</tr>
<tr>
<td>2. Written and Oral Communication</td>
<td>☐</td>
</tr>
<tr>
<td>3. Humanities and Social Sciences</td>
<td>☐</td>
</tr>
<tr>
<td>4. Multicultural Awareness</td>
<td>☐</td>
</tr>
<tr>
<td>5. International Understanding</td>
<td>☐</td>
</tr>
<tr>
<td>6. Capstone</td>
<td>☐</td>
</tr>
</tbody>
</table>
iii. Outcomes:

At the end of this course, students will be able to: 1) describe the issues, facts, and concepts central to a broad range of environmental and conservation topics; 2) form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news; and 3) describe the work done in five scientific disciplines: ecology, environment, resource management, conservation biology, and environmental geology.

This course helps satisfy the following embedded outcomes:

1. Critical Thinking
2. Ethical Reasoning
3. Global Citizenship and Social Responsibility
4. Quantitative Reasoning

iv. Methods of evaluation or assessment:

Exams and quizzes ☒
Assessment and scoring of in class participation ☒
Assignments ☒
Class presentations ☐
Other (specify):
FNR 12500/EAPS 12500/NRES 12500/AGRY 12500

Environmental Science and Conservation

Syllabus –Fall 2017 [copied from 2016]

Instructor: Dr. John G. Graveel
Office: 3440 Lilly
Email: jgraveel@purdue.edu

Phone: 494-8060
Office Hours: Wed. 8:30-9:30

Instructor: Dr. John B. Dunning, Jr.
Office: G003D Pfendler Hall
Email: jdunning@purdue.edu

Phone: 494-3565
Office Hours: Tues. 1:30-2:30

Instructor: Dr. Jeff Dukes
Office: 221A Pfendler Hall
Email: jsdukes@purdue.edu

Phone: 494-1446
Office Hours: Wed. 3:30-4:30

Instructor: Dr. Nathaniel Lifton
Office: 3275 Hampton Hall
Email: nlifton@purdue.edu

Phone: 494-0754
Office Hours: By appointment

TA: Megan Scott
Office: 220 Pfendler Hall
Email: scott257@purdue.edu

Office Hours: Th. 10:00-11:00

When you have questions about the course, send an email first to Megan and she will make sure your question gets to the correct instructor.

Text and Learning Tools:
Cunningham, W.P. & M.A. Cunningham. 2017. Principles of Environmental Science. McGraw-Hill. Eighth Edition. Available as either a print or E-BOOK; you get the e-book when you purchase Connect (with LearnSmart) through McGraw-Hill’s website. You will also need an i<clicker2 and LearnSmart, the online learning system for this course. Instructions on obtaining all of these are posted on Blackboard.

Course Overview/Description:
This course is offered to students interested in an introductory natural resource or environmental science elective. Topics include: an introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. We will discuss issues currently in the news such as climate change, energy policy, protection of endangered species, handling of hazardous waste, and pollution prevention and control.
Learning Outcomes:
At the end of this course, students will be able to:

1. describe the issues, facts, and concepts central to a broad range of environmental and conservation topics,
2. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
3. describe the work done in four scientific disciplines: ecology, environment, resource management, and conservation biology.

Course Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Week</th>
<th>Learn Smart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 22</td>
<td>Introduction (All Instructors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Science and the environment (Dunning/Lifton)</td>
<td>Week 1</td>
<td>Ch. 1</td>
</tr>
<tr>
<td>26</td>
<td>Politics and the environment (Dukes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Economics and the environment (Dunning)</td>
<td></td>
<td></td>
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<tr>
<td>31</td>
<td>Human population growth (Graveel)</td>
<td>Week 2</td>
<td></td>
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<tr>
<td>Sept. 2</td>
<td>Basic Ecology (Dunning)</td>
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<td>Ch. 3</td>
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<tr>
<td>5</td>
<td>LABOR DAY – no class</td>
<td></td>
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<tr>
<td>7</td>
<td>Forest and grassland systems (Dunning)</td>
<td>Week 3</td>
<td>Ch. 5, pt 1</td>
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<tr>
<td>9</td>
<td>Fire ecology (Dunning)</td>
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<td>Ch. 6</td>
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<tr>
<td>12</td>
<td>National Parks and Wilderness (Dunning)</td>
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<tr>
<td>14</td>
<td>Biodiversity (Dunning)</td>
<td>Week 4</td>
<td>Ch. 5, pt 2</td>
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<tr>
<td>16</td>
<td>Extinction (Dunning)</td>
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<td>19</td>
<td>Habitat loss and fragmentation (Dunning)</td>
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<td>21</td>
<td>Genetic conservation (Dunning)</td>
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<td>Week 5</td>
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<tr>
<td>23</td>
<td>Endangered species &amp; CITES (Dunning)</td>
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<tr>
<td>26</td>
<td><strong>EXAM 1</strong></td>
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<td>28</td>
<td>Human population (j-curve) (Graveel)</td>
<td>Week 6</td>
<td>Ch. 4</td>
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<tr>
<td>30</td>
<td>Food resources agriculture, GMO’s (Graveel)</td>
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<td>Oct. 3</td>
<td>Physical Properties of Soil (Graveel)</td>
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<td>Ch. 7</td>
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<tr>
<td>5</td>
<td>Chemical Properties of Soil (Graveel)</td>
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<tr>
<td>7</td>
<td>Solid waste – landfills/recycling (Graveel)</td>
<td>Week 7</td>
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<td>10</td>
<td><strong>Fall Break</strong></td>
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<tr>
<td>12</td>
<td>Solid toxic and hazardous waste (Graveel)</td>
<td>Week 8</td>
<td>Ch. 14</td>
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<tr>
<td>14</td>
<td>Bioremediation (Graveel)</td>
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<td>17</td>
<td>Toxicology (Graveel)</td>
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<td>Ch. 8</td>
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<tr>
<td>19</td>
<td>Emerging Environ. Contaminants (Graveel)</td>
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<td>Week 9</td>
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<td>21</td>
<td><strong>EXAM 2</strong></td>
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<tr>
<td>24</td>
<td>Air resources (Lifton)</td>
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<td>Ch. 10</td>
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<tr>
<td>26</td>
<td>Air pollution (Lifton)</td>
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<td>Week 10</td>
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<tr>
<td>28</td>
<td>Water resources (Lifton)</td>
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<td>Ch. 11</td>
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<td>Surface water pollution (Lifton)</td>
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<tr>
<td>Nov. 2</td>
<td>Ground water pollution (Lifton)</td>
<td>Week 11</td>
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<tr>
<td>4</td>
<td>Geology basics (Lifton)</td>
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<td>Ch. 12</td>
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</table>
7 Geology hazards I (Lifton)  
9 Geology hazards II (Lifton)  Week 12  
11 EXAM 3  
14 Climate change mechanisms & evidence (Dukes) Ch. 9 Part 1  
16 Climate change drivers & projections (Dukes) Week 13 Ch. 9 Part 2  
18 Climate change impacts (Dukes) Ch. 9 Part 3  
21 Climate change solutions (Dukes)  
23-25 Thanksgiving Break Week 14  
28 Energy resources and consumption: fossil fuels (Dukes) Ch. 13 Part 1  
30 Energy consumption: fossil fuels 2 (Dukes) Week 15 Ch. 13 Part 2  
Dec.  2 Energy conservation and alternatives: solar (Dukes) Ch. 13 Part 3  
5 Energy alternatives: wind, nuclear power (Dukes)  
7 The big picture: Population, energy, climate, environment (Dukes) Week 16  
9 Course wrap-up (all)  
Dec 12-17 FINAL EXAM PERIOD - Date of final to be announced  

**Assignments:**  
3 (out of 4) Hour Exams @ 100 points = 300  
Comprehensive Final Exam* @ 100 points = 100  
Learn Smart** 13 modules @ 7 points = 91  
Lecture participation, iclicker @ 50 points = 50  
Class Participation*** @ 59 points = 59  
Total possible points 600  

* Comprehensive Final Exam. The final exam will consist of two parts, Exam 4 and a comprehensive final. Each part will be worth 100 points. Your lowest or missing exam score (including Exam 4) will be dropped. The comprehensive portion of the final will not be dropped.  

** LearnSmart modules. There are 13 modules, and each is worth 7 points, totaling 91 points.  

*** Class participation includes: in class assignments, home work, and case studies.  

**Grading:**  
A+ 98% and above, A 93-97.9%, A- 90-92.9%, B+ 87-89.9%, B 83-86.9%, B- 80-82.9%, C+ 77-79.9%, C 73-76.9%, C- 70-72.9%, D+ 67-69.9%, D 63-66.9%, D- 60-62.9%, F below 59.9%  

MAKEUP POLICY ON EXAMS: There are four exams and a comprehensive final exam. We will drop your lowest exam score; however, the final is comprehensive and may not be dropped. **If you miss a test due to an emergency, talk to Dr. Graveel immediately.** All makeups of the midterm exams must be done within a week of the regularly scheduled exam date.
**LEARNSMART MODULES:** We use LearnSmart, an online homework system to take the place of in-class quizzes. The system will be described in class. There is one module to review for each textbook chapter that is assigned. The good news is that most people who finish the modules get 100% of the points for this part of the class (which was not true for the quizzes); but it does require that you actually DO the online work. Also, keep in mind that access to Blackboard (which you will use to access the LearnSmart modules) and LearnSmart can go down unpredictably, so waiting until the last second to do the assignments is risky.

**ICLICKER:** One of the difficulties associated with teaching (and learning) in a large-enrollment class is that there is little ability for you to feel personally involved in the learning process. To combat this problem, we use the i>clicker2 to make the course more interactive. You will need an “i>clicker2” remote which can be purchased from the bookstores. Earlier i>clicker models will work, but other brands of clickers will not. If you purchase the textbook from the local bookstores, you may get a coupon that gets you a discount on the clicker. If you bought an i>clicker2 for another class or previous semester, you will be able to use it in this class. You need to register your clicker for use in this class, and there will be a link on the Blackboard course for you to do this. ***You should not go online to register your clicker outside of Blackboard.*** Although we will not use the clickers each day, we will use it at least twice a week after August 26. **You cannot get the class participation points if you do not register an i>clicker2 for use in this class.**

The clickers allow us to pose questions and have you answer them in class. The system tabulates your responses almost instantaneously, so we can show you the answers given by the entire class. We will use this system to offer opinions, answer review questions, go over difficult material, and otherwise provide feedback to things going on in class. We will not use the system to grade how you answer each specific question – in other words, it is not a way of quizzing you every day. Instead, we will get a summary of who answered each day – essentially you will be recorded as participating in the clicker sessions. **If you respond to at least 50% of the questions asked during a class session, then you will get the class participation point for that session.** Lower levels of participation will result in zero points.

**A MAJOR POINT:** you cannot record your answers to the questions without the i>clicker2. So if you don’t bring it to class, you cannot earn the class participation point that day. Some people feel that clickers are simply a way of taking attendance, but it is more than that – participating in the question-and-answer sessions helps you learn by promoting a more active learning style. That is why you have to have the clicker and use it to get the participation point – it is not enough to just be in the room and sit there. Even though we will not be using it each day, it would be best if you have it with you for every class. **MAJOR HINT:** DAYS BEFORE MAJOR HOLIDAYS OR CAMPUS SOCIAL EVENTS ARE GOOD DAYS TO BE PRESENT AND HAVE YOUR CLICKER WITH YOU. We do not use the clickers on days when we have an exam.

It is possible to grade the responses and give extra points for giving correct answers. We will do this occasionally as a way of earning extra credit. We can’t do it for all questions, because we ask some opinion questions for which there is no correct answer.

**ACADEMIC DISHONESTY:** Purdue has a strong policy against cheating, and we work to reduce the likelihood that you can successfully copy off of each other and otherwise try to avoid
doing your own work during tests. See the following website for the Purdue policy:

http://www.purdue.edu/studentregulations/student_conduct/index.html. Policies on how exams are administered will be explained in class before the first one. One point: **you will need a picture ID for all exams.** Students who cheat on tests will receive an F on that test and will most likely be expelled from the course with an F grade. All instances of cheating will be reported to the Dean of Students, and further disciplinary action at the university level (e.g., expulsion) is possible. Do not speak to other students during exams, even to translate words into another language for them. Notes and books are not allowed for any tests.

The clickers present a special problem. The way we use the system is designed to reward you for regular participation. However, some of you will be tempted to give your clicker to a classmate and let them record you as participating in the course. Be aware of the following policy: **IF ANYONE IS CAUGHT WITH MORE THAN ONE CLICKER IN CLASS, THE CLICKERS WILL BE CONFISCATED AND ALL PEOPLE INVOLVED WILL BE EXPELLED FROM THE CLASS WITH AN ‘F’ GRADE.** Each clicker is registered for use in this class using its unique serial number, so it is no problem to identify those involved.

**STUDENTS WITH DISABILITIES:** If you have a disability that requires some special accommodation, please talk to Dr. Graveel in the first three weeks of the semester to discuss the instruction techniques in this class, tests or any other academic adjustments that you may need.

**DIVERSITY STATEMENT:** *In this course, each voice in the classroom has something of value to contribute. Please take care to respect the different experiences, beliefs and values expressed by students and staff involved in this course. We support Purdue's commitment to diversity, and welcome individuals of all ages, backgrounds, citizenships, disability, sex, education, ethnicities, family statuses, genders, gender identities, geographical locations, languages, military experience, political views, races, religions, sexual orientations, socioeconomic statuses, and work experiences.*

**CLASS CITIZENSHIP:** A potential challenge of learning in a large lecture hall with hundreds of students is that there can be an enormous amount of distraction. In an undisciplined classroom, students talking, rustling through pages of the newspaper, surfing the web, or watching movies on their cell phones in your vicinity can make it nearly impossible to pay attention to the lecturer. The same goes for students whose cell phones ring in class. If the professor has to spend class time telling students to stop disrupting the class, it takes away from everyone’s time to learn. Please do your part and ask students around you who are causing disruptions to stop. If your friend is talking to you, tell them to wait until after class. If it gets to the point where we or the TA or proctors have to quiet you down or notice you watching something on your computer or phone, we may penalize you by subtracting points from your grade.

Another challenge of being part of a large class is that many students can be hesitant to ask or answer questions in front of so many of their peers. We recognize that you may be reluctant to speak in class, but we encourage you to try to overcome this reluctance – your participation in class, and your willingnessness to ask what you may think are “stupid questions” will improve the experience for everyone – including us! At the end of the semester, we may award extra participation points to students who have consistently made useful contributions to the class discussion, or have otherwise taken initiative to improve the learning environment.
EMERGENCY PREPARENESS PROCEDURES:
Purdue University is a very safe campus and there is a low probability that a serious incident will occur here at Purdue. However, just as we receive a “safety briefing” each time we get on an aircraft, we want to emphasize our emergency procedures for evacuation and shelter in place incidents. Our preparedness will be critical IF an unexpected event occurs! Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Let’s review the following procedures:

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view [www.purdue.edu/ea](http://www.purdue.edu/ea)
  - If we hear a **fire alarm**, we will immediately suspend class, **evacuate the building**, and proceed outdoors, and away from the building. **Do not use the elevator.**
- If we are notified of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in the lowest level of this building away from windows and doors.
- If we are notified of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights.

EMERGENCY PREPARENESS WEBSITE:

EMERGENCY: In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in *this* course: the Blackboard online course, our department emails and our office phones (see top of syllabus).

FURTHER INFORMATION ABOUT LEARNSMART / CONNECT:
ACCESS: Connect is purchased online through the course Blackboard page. When you purchase Connect online, you will get an interactive eBook version of the required textbook for this course. If you prefer to purchase the text through the bookstore, you should get a Connect access codes packaged with the new textbook (however, this is much more expensive than purchasing the e-book online, see below). NOTE: You can register for a free trial period in Connect and have access to Learnsmart and the textbook without paying. This trial period is for a limited time period (typically three weeks, so it won’t get you through the semester but might be an option if you have limited funds at the start). If you prefer to read a hard copy of the textbook, you can select an option to purchase a looseleaf version of the text when you register for Connect (typically the looseleaf text costs $25 or less). Connect should cost about $85 (or $110 with the
looseleaf textbook). Hard copies of the textbook now cost over $200 but the access code is included so you won’t have to pay more for the Learnsmart program.

REGISTRATION: To register in Connect, please click on the first link for a Learnsmart module (textbook chapter) on the course Blackboard webpage. This will direct you to the publisher’s webpage. After you review your options, click “Register Now.”

SUPPORT & TIPS: Please review the “Registering for Connect (Learnsmart)” document (available on Blackboard) for help getting started with Connect and LearnSmart. If you have any issues while registering or using Connect, please contact McGraw-Hill’s Customer Experience team through http://www.mhhe.com/support or at 800-331-5094. To avoid problems related to unexpected technical issues, you are advised not to wait until the last moment to complete assignments. Do NOT contact the professors or your TA about problems with LearnSmart until you have tried to address them with McGraw-Hill staff. It is unlikely that we will be able to help you with this system as much as the help staff (after all, it’s their job!).
# Fisheries and Aquatic Sciences

Bachelor of Science in Agriculture (FAQS) 120± Credits

The fisheries and aquatic sciences program prepares students for professional careers in fisheries research and management, information and education, and interdisciplinary investigations of environmental problems. Emphasis is on freshwater systems. Graduates receive a Bachelor of Science in Agriculture degree, and meet the academic certification requirements of the American Fisheries Society. Sustainable management of natural resource systems in the real world is emphasized.

## Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
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</thead>
<tbody>
<tr>
<td>(0.5) AGR 10100 Intro to College of Agriculture &amp; Purdue*</td>
<td>(4) BTNY 11000 Introduction to Plant Science*†</td>
</tr>
<tr>
<td>(0.5) AGR 11900 Intro to FNR Academic Programs*</td>
<td>(3) CHM 11200 General Chemistry II*†</td>
</tr>
<tr>
<td>(4) BIOL 11000 Fundamentals of Biology I*†</td>
<td>(3) COM 11400 Fundamentals of Speech Communication*†</td>
</tr>
<tr>
<td>(3) CHM 11100 General Chemistry I*†</td>
<td>(3) FNR 10300 Intro. to Environmental Conservation*†</td>
</tr>
<tr>
<td>(3-4) English Comp. (ENGL 10600 or ENGL 10800)*†</td>
<td>(3) FNR 12500 Environmental Science &amp; Conservation*†</td>
</tr>
<tr>
<td>(3) MA 16010 Applied Calculus I*†</td>
<td>(3) MA 16020 Applied Calculus II*†</td>
</tr>
<tr>
<td>(14-15)</td>
<td>(16)</td>
</tr>
</tbody>
</table>

## Sophomore Year

<table>
<thead>
<tr>
<th>Third Semester</th>
<th>Fourth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) Economics selective*†</td>
<td>(3) AGRY 25500 Soil Science or AGRY 27000 Forest Soils</td>
</tr>
<tr>
<td>(3) FNR 20100 Marine Biology</td>
<td>(2) BIOL 28600 Introduction to Ecology and Evolution</td>
</tr>
<tr>
<td>(3) FNR 24150 Ecology &amp; Systematics of Fishes, Amphibians, and Reptiles</td>
<td>(3) FNR 21000 Natural Resource Information Mgmt.</td>
</tr>
<tr>
<td>(1) FNR 24250 Laboratory in Ecology &amp; Systematics of Birds of Fishes, Amphibians, and Reptiles</td>
<td>(3) FNR 25150 Ecology &amp; Systematics of Mammals and Birds</td>
</tr>
<tr>
<td>(3) Written or oral communication selective*</td>
<td>(3) FNR 35100 Aquatic Sampling Techniques</td>
</tr>
<tr>
<td>(16)</td>
<td>(15)</td>
</tr>
</tbody>
</table>

### Summer Session

(Courses in bold are prerequisites for FNR 37010 and 37100. Courses in italics are prerequisites for courses in bold.)

| (1) FNR 37010 Natural Resources Practicum |
| (5) FNR 37100 Fisheries and Aquatic Sciences Practicum |
| (6) |

## Junior Year

<table>
<thead>
<tr>
<th>Fifth Semester</th>
<th>Sixth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) FNR 23000 World’s Forests &amp; Society</td>
<td>(3) FNR 30500 Conservation Genetics</td>
</tr>
<tr>
<td>(3) FNR 45400 Fisheries Science and Management</td>
<td>(3) FNR 37500 Human Dimen. of Natural Resource Mgmt.</td>
</tr>
<tr>
<td>(3) POL 22300 Introduction to Environment Policy or FNR 22310 Introduction to Environmental Policy</td>
<td>(3) FNR 45500 Fish Ecology or FNR 45300 Fish Physiol.</td>
</tr>
<tr>
<td>(3) Humanities or social sciences selective*</td>
<td>(3) Physical science selective</td>
</tr>
<tr>
<td>(12)</td>
<td>(15)</td>
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</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Seventh Semester</th>
<th>Eighth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) FNR 47000 Fundamentals of Planning</td>
<td>(3) FNR 40800 Natural Resources Planning</td>
</tr>
<tr>
<td>(2) FNR 52600 Aquatic Animal Health or FNR 52700 Ecotoxicology</td>
<td>(3) FNR 45200 Aquaculture</td>
</tr>
<tr>
<td>(3) Ethics selective*†</td>
<td>(3) Humanities or social sciences selective*</td>
</tr>
<tr>
<td>(3) Physical science selective</td>
<td>(3) Unrestricted elective</td>
</tr>
<tr>
<td>(3) Unrestricted elective</td>
<td>(1-2) Unrestricted elective</td>
</tr>
<tr>
<td>(12)</td>
<td>(13-14)</td>
</tr>
</tbody>
</table>
Forestry
Bachelor of Science in Forestry (FORS) 124+ credits

The forestry program prepares students for professional careers with organizations that manage forest and related lands. Students apply biological, ecological, economic, and social knowledge to develop and administer forest management plans. Graduates receive a Bachelor of Science in Forestry degree. The program is accredited by the Society of American Foresters. Sustainable management of natural resource systems in the real world is emphasized.

### Freshman Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0.5) AGR 10100 Intro to College Agriculture &amp; Purdue*</td>
<td>(4) BTNY 11000 Introduction to Plant Science**</td>
</tr>
<tr>
<td>(0.5) AGR 11900 Intro to FNR Academic Programs†</td>
<td>(3) CHM 11200 General Chemistry II†</td>
</tr>
<tr>
<td>(4) BIOL 11000 Fundamentals of Biology I††</td>
<td>(3) COM 11400 Fundamentals of Speech Communication††</td>
</tr>
<tr>
<td>(3) CHM 11000 General Chemistry I††</td>
<td>(3) FNR 10300 Intro. to Environmental Conservation††</td>
</tr>
<tr>
<td>(3-4) English Comp. (ENGL 10600 or ENGL 10800)‡</td>
<td>(3) FNR 12500 Environmental Science &amp; Conservation‡†</td>
</tr>
<tr>
<td>(3) MA 16010 Applied Calculus I†</td>
<td>(3) MA 16020 Applied Calculus II††</td>
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<tr>
<td>(14-15)</td>
<td>(16)</td>
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</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Third Semester</th>
<th>Fourth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) Economics selective††</td>
<td>(3) AGRY 27000 Forest Soils</td>
</tr>
<tr>
<td>(3) FNR 22500 Dendrology</td>
<td>(2) BIOL 28600 Introduction to Ecology and Evolution</td>
</tr>
<tr>
<td>(3) FNR 23000 World’s Forests &amp; Society</td>
<td>(3) FNR 21000 Natural Resource Information Mgmt. Laboratory in ecology &amp; systematics selective</td>
</tr>
<tr>
<td>(3) Ecology &amp; systematics selective</td>
<td>(1) FNR 35300 Natural Resources Measurement‡</td>
</tr>
<tr>
<td>(3) STAT 30100 Elementary Statistical Methods‡‡</td>
<td>(3) Written or oral communication selective*</td>
</tr>
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<td></td>
<td>(15)</td>
</tr>
</tbody>
</table>

### Summer Session

(Courses in bold are prerequisites for FNR 37010, 37050 or 37200. Courses in italics are prerequisites for courses in bold.)

(1) FNR 37010 Natural Resources Practicum
(1) FNR 37050 Forest Habitats and Communities Practicum
(4) FNR 37200 Forestry Practicum
(6) 

### Junior Year

<table>
<thead>
<tr>
<th>Fifth Semester</th>
<th>Sixth Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>(3) FNR 33100 Forest Ecosystems</td>
<td>(3) FNR 35500 Quantitative Methods for Resource Mgmt.</td>
</tr>
<tr>
<td>(3) POL 22300 Introduction to Environmental Policy or FNR 22310 Introduction to Environmental Policy</td>
<td>(3) FNR 37500 Human Dimen. of Natural Resource Mgmt.</td>
</tr>
<tr>
<td>(3) FNR 35700 Fundamental Remote Sensing</td>
<td>(3) FNR 40700 Forest Economics</td>
</tr>
<tr>
<td>(3) FNR 43400 Tree Physiology</td>
<td>(3) Humanities or social sciences selective*</td>
</tr>
<tr>
<td>(3) Forest health selective</td>
<td>(3) Unrestricted elective</td>
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<tr>
<td>(15)</td>
<td>(15)</td>
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</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Seventh Semester</th>
<th>Eighth Semester</th>
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</thead>
<tbody>
<tr>
<td>(3) FNR 33900 Principles of Silviculture</td>
<td>(3) FNR 30110 Sustainable Wood Products and Manuf.</td>
</tr>
<tr>
<td>(1) FNR 47000 Fundamentals of Planning</td>
<td>(3) Forestry selective</td>
</tr>
<tr>
<td>(3) Ethics selective</td>
<td>(3) FNR 40910 Forest Resource Management</td>
</tr>
<tr>
<td>(3) Humanities or social sciences selective*</td>
<td>(3) Humanities or social sciences selective*</td>
</tr>
<tr>
<td>(3) Unrestricted elective</td>
<td>(2-3) Unrestricted elective</td>
</tr>
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<td>(13)</td>
<td>(14-15)</td>
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</tbody>
</table>
**Wildlife**

Bachelor of Science in Agriculture (WDL) 120+ credits

The wildlife program prepares students for professional careers in wildlife research, management, and education. Students apply biological, ecological, economic, and social knowledge to develop and administer wildlife management plans. Graduates receive a Bachelor of Science in Agriculture degree. Sustainable management of natural resource systems in the real world is emphasized.

### Freshman Year

**First Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>AGR 10100</td>
<td>Intro to College Agriculture &amp; Purdue*</td>
</tr>
<tr>
<td>AGR 11900</td>
<td>Intro to FNR Academic Programs*</td>
</tr>
<tr>
<td>BIOL 11000</td>
<td>Fundamentals of Biology I**</td>
</tr>
<tr>
<td>CHM 11100</td>
<td>General Chemistry I**</td>
</tr>
<tr>
<td>English Comp.</td>
<td>ENGL 10600 or ENGL 10800)*†</td>
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<tr>
<td>MA 16010</td>
<td>Applied Calculus I**</td>
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</table>

**Second Semester**

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>BTNY 11000</td>
<td>Introduction to Plant Science**</td>
</tr>
<tr>
<td>CHM 11200</td>
<td>General Chemistry II**</td>
</tr>
<tr>
<td>COM 11400</td>
<td>Fundamentals of Speech Communication**</td>
</tr>
<tr>
<td>FNR 10200</td>
<td>Intro. to Environmental Conservation**</td>
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<tr>
<td>FNR 12500</td>
<td>Environmental Science &amp; Conservation**</td>
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<tr>
<td>MA 16020</td>
<td>Applied Calculus II**</td>
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### Sophomore Year

**Third Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>Economics selective*†</td>
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</tr>
<tr>
<td>FNR 22500</td>
<td>Dendrology</td>
</tr>
<tr>
<td>FNR 24150</td>
<td>Ecology &amp; Systematics of Fishes, Amphibians and Reptiles</td>
</tr>
<tr>
<td>FNR 24250</td>
<td>Laboratory in Ecology &amp; Systematics of Fishes, Amphibians, and Reptiles</td>
</tr>
<tr>
<td>STAT 30100</td>
<td>Elementary Statistical Methods**</td>
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**Fourth Semester**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 28600</td>
<td>Introduction to Ecology and Evolution</td>
</tr>
<tr>
<td>FNR 21000</td>
<td>Natural Resource Information Mgmt.</td>
</tr>
<tr>
<td>FNR 25150</td>
<td>Ecology &amp; Systematics of Mammals and Birds</td>
</tr>
<tr>
<td>FNR 25250</td>
<td>Laboratory in Ecology &amp; Systematics of Mammals and Birds</td>
</tr>
<tr>
<td>FNR 34800</td>
<td>Wildlife Techniques</td>
</tr>
<tr>
<td>Humanities or social sciences selective*</td>
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</table>

**Summer Session**

(Courses in bold are prerequisites for FNR 37010, 37050, or 37300. Courses in italics are prerequisites for courses in bold.)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>FNR 37010</td>
<td>Natural Resources Practicum</td>
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<tr>
<td>FNR 37050</td>
<td>Forest Habitats and Communities Practicum</td>
</tr>
<tr>
<td>FNR 37300</td>
<td>Wildlife Practicum</td>
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### Junior Year

**Fifth Semester**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>FNR 33100</td>
<td>Forest Ecosystems</td>
</tr>
<tr>
<td>POL 22300</td>
<td>Intro to Environmental Policy or FNR 22310 Intro to Environmental Policy</td>
</tr>
<tr>
<td>FNR 34100</td>
<td>Wildlife Habitat Management</td>
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<tr>
<td>Written or oral communication selective</td>
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**Sixth Semester**

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<th>Course Code</th>
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<tbody>
<tr>
<td>FNR 37500</td>
<td>Human Dimensions of Natural Resource Management*</td>
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<tr>
<td>Botany selective</td>
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<tr>
<td>Unrestricted elective</td>
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<tr>
<td>Wildlife selective</td>
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</table>

### Senior Year

**Seventh Semester**

<table>
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<th>Course Code</th>
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<tbody>
<tr>
<td>FNR 44700</td>
<td>Vertebrate Population Dynamics</td>
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<tr>
<td>FNR 47000</td>
<td>Fundamentals of Planning</td>
</tr>
<tr>
<td>Ethics selective*†</td>
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<tr>
<td>Wildlife disease selective</td>
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<tr>
<td>Unrestricted elective</td>
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**Eighth Semester**

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<tbody>
<tr>
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<td>Conservation Genetics</td>
</tr>
<tr>
<td>FNR 40800</td>
<td>Natural Resources Planning</td>
</tr>
<tr>
<td>Humanities or social sciences selective*</td>
<td></td>
</tr>
<tr>
<td>Wildlife selective</td>
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</table>

(13-14)
This program prepares students for management positions in wood products manufacturing, particularly for the hardwood cabinet and furniture industries. It features knowledge in wood-based materials (biomaterials), and design and processing of wood products, industrial engineering technology and sustainability concepts. Graduates receive a Bachelor of Science in Agriculture.

### Freshman Year

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<td>(0.5) AGR 10100 Intro to College Agriculture &amp; Purdue*</td>
<td>(4) BTNY 11000 Introduction to Plant Science†</td>
</tr>
<tr>
<td>(0.5) AGR 11900 Intro to FNR Academic Programs*</td>
<td>(3) CHM 11200 General Chemistry II†</td>
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<td>(4) BIOL 11000 Fundamentals of Biology I†</td>
<td>(3) COM 11400 Fundamentals of Speech Communication†</td>
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<tr>
<td>(3) CHM 11100 General Chemistry I†</td>
<td>(3) FNR 10300 Intro. to Environmental Conservation†</td>
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<tr>
<td>(3-4) English Comp. (ENGL 10600 or ENGL 10800)*†</td>
<td>(3) FNR 12500 Environmental Science &amp; Conservation†</td>
</tr>
<tr>
<td>(3) MA 16010 Applied Calculus I†</td>
<td>(3) Ethics Selective†</td>
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### Sophomore Year

<table>
<thead>
<tr>
<th>Third Semester</th>
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<tbody>
<tr>
<td>(3) Economics selective†</td>
<td>(3) CGT 11000 Technical Graphics Communications</td>
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<tr>
<td>(3) Environmental policy selective</td>
<td>(3) FNR 30110 Sustainable Forest Products</td>
</tr>
<tr>
<td>(3) MET 14300 Materials and Processes I</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>(3) STAT 30100 Elementary Statistical Methods†</td>
<td>(3) TLI 23500 Introduction to Lean Manufacturing and Sustainability</td>
</tr>
<tr>
<td>(3) Sustainability selective</td>
<td>(4) PHYS 22000 General Physics</td>
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<tr>
<td></td>
<td>(3) Unrestricted elective</td>
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### Junior Year

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<tr>
<th>Fifth Semester</th>
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<tr>
<td>(3) FNR 23000 World’s Forests &amp; Society</td>
<td>(3) EEE 35500 Engineering Environmental Sustainability</td>
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<tr>
<td>(3) FNR 41800 Properties of Wood Related to Manufacturing</td>
<td>(3) FNR 31110 Structure, Identification &amp; Properties of Woody Biomaterials</td>
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<td>(3) ENGL 42100 Technical Writing†</td>
<td>(3) MET 24500 Manufacturing Systems</td>
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<tr>
<td>(3) TLI 31600 Statistical Quality Control</td>
<td>(3) Humanities/social sciences selective (30000+ level)*</td>
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<tr>
<td>(3) Humanities selective*</td>
<td>(3) Humanities/social sciences selective†</td>
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### Senior Year

<table>
<thead>
<tr>
<th>Seventh Semester</th>
<th>Eighth Semester</th>
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<tr>
<td>(3) FNR 42500 Secondary Wood Products Manufacturing</td>
<td>(2) FNR 30200 Global Sustainability Issues</td>
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<tr>
<td>(3) FNR 48410 Sustainable Furniture Design for CNC Manufacturing</td>
<td>(3) FNR 41910 Furniture Product, Development &amp; Strength Design</td>
</tr>
<tr>
<td>(3) TLI 43530 Operations Planning and Management</td>
<td>(3) TLI 43540 Facilities Planning and Material Handling</td>
</tr>
<tr>
<td>(3) TLI 33400 Economic Analysis for Technology Systems</td>
<td>Sustainability selective</td>
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<tr>
<td>(3) Unrestricted elective</td>
<td>(2-3) Unrestricted elective</td>
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</table>
You must complete 9 credits of coursework with an international focus and 3 credits in the area of multicultural awareness. These may overlap with other required or selective coursework.

*The most current approved course lists for College of Agriculture Core requirements, including humanities, social sciences, written or oral communications, international understanding, and multicultural awareness, are available at [http://www.ag.purdue.edu/oap/Pages/core_requirements.aspx](http://www.ag.purdue.edu/oap/Pages/core_requirements.aspx).

†University Common Core requirements are explained at [http://www.purdue.edu/provost/initiatives/curriculum/course.html](http://www.purdue.edu/provost/initiatives/curriculum/course.html).

**Economics selective**: AGEC 20300 Introductory Microeconomics for Food and Agribusiness; AGEC 20400 Introduction to Resource Economics and Environmental Policy; AGEC 21700 Economics; ECON 21000 Principles of Economics; or ECON 25100 Microeconomics.

**Environmental policy selective**: FNR 22310 Introduction to Environmental Policy or POL 22300 Introduction to Environmental Policy.

**Ethics selective**: PHIL 11100 Ethics; PHIL 28000 Ethics and Animals; PHIL 29000 Environmental Ethics.

**Physics selective**: PHYS 15200 Mechanics; PHYS 22000 General Physics; PHYS 22100 General Physics.

**Sustainability selective**: EEE 30000 Environmental Ecology Modeling; EEE 43000 Industrial Ecology and LCA; ENR 30200 Global Sustainability Issues; FNR 37500 Human Dimensions of Natural Resources; FNR 40600 Natural Resource Environmental Economics; FNR 46000 International Natural Resources Issues; FNR 47000 Fundamentals of Planning; FNR 48800 Global Environmental Issues; FNR 49000 Sustainable Product/Process Design Guided Research; FNR 57200 Community Involvement in Natural Resources; POL 32700 Global Green Politics; POL 42900 Climate, Science, Society; SFS 30200 Principles of Sustainability; TECH 19000 Applied Sustainability Principles.

**Course prerequisites**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Prerequisites (Fall 2016, may change without notice)</th>
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<tr>
<td>CGT 11000</td>
<td>Must request major restriction override</td>
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<tr>
<td>CHM 11200</td>
<td>CHM 11100 Minimum Grade of D or CHM 11500 Minimum Grade of D Abbreviated; see course catalog for full prerequisite listing</td>
</tr>
<tr>
<td>TLI 31600</td>
<td>MA 15800 Minimum Grade of D- or MA 16100 Minimum Grade of D- or MA 16500 Minimum Grade of D- or MA 16010 Minimum Grade of D- or (MA 15300 Minimum Grade of D- and MA 15400 Minimum Grade of D-) Abbreviated; see course catalog for full prerequisite listing</td>
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<tr>
<td>TLI 33400</td>
<td>MA 15800 Minimum Grade of D- or MA 16100 Minimum Grade of D- or MA 16500 Minimum Grade of D- or MA 16010 Minimum Grade of D- or (MA 15300 Minimum Grade of D- and MA 15400 Minimum Grade of D-) or (STAT 22500 Minimum Grade of D- or STAT 30100 Minimum Grade of D-) Abbreviated; see course catalog for full prerequisite listing</td>
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<tr>
<td>TLI 43530</td>
<td>MA 15800 Minimum Grade of D- or MA 16100 Minimum Grade of D- or MA 16500 Minimum Grade of D- or MA 16010 Minimum Grade of D- or (MA 15300 Minimum Grade of D- and MA 15400 Minimum Grade of D-) Abbreviated; see course catalog for full prerequisite listing</td>
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<tr>
<td>TLI 43540</td>
<td>(MET 14300 Minimum Grade of D- or MET 14400 Minimum Grade of D-) and TLI 43530 Minimum Grade of D-</td>
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<td>MET 24500</td>
<td>(MET 14300 Minimum Grade of D- or MET 14400 Minimum Grade of D-) and (CGT 11000 Minimum Grade of D- or CGT 16300 Minimum Grade of D-)</td>
</tr>
<tr>
<td>MA 16010</td>
<td>ALEKS Math Assessment 075 or SAT Mathematics 600 or ACT Math 26 or (MA 15400 Minimum Grade of C- or MATH 15400 Minimum Grade of C-) or MA 15800 Minimum Grade of C-</td>
</tr>
</tbody>
</table>
A. COURSES TO BE DELETED

HORT 21800 Herbaceous Landscape Plants
**Justification:** The course is being divided into two separate courses HORT 21810, Flowers for Color, 1 credit and HORT 21820, Hardy Herbaceous Landscape Plants, 2 credits. Separating the different characteristics of plant materials covered in HORT 21800 into two courses will appeal to an array of interested students in horticulture as well as landscape architecture who may not want the full breadth of herbaceous landscape plants.

**Impact on Learning Outcomes:** None.

HORT 22300 AutoCAD Applications in Horticulture
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** None. Students will receive an introduction to AutoCAD in an anticipated revised LA 11600.

HORT 31000 Planting Design Basics
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** None. The requirement is being replaced with LA 10110 and LA 16100 which will cover the design basics and in addition will provide other practical information.

HORT 31500 Landscape Design
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** None. Course materials will be covered in LA 22700 - Planting Design I, credit hours: 3.00. Review of design principles as related to plant design characteristics; design implications of plant responses to environment; review of landscape plants in fall.

HORT 31600 Landscape Construction
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** None. Course materials will be covered in LA 24600 - Site Systems I, credit hours: 4.00. Properties of hardscape materials, their methods of detailing and specification. Introduction to masonry, wood and site furnishings. Design of pavements, walls, steps, ramps and other common site elements. Standards and methods of detailing and notation are presented in small-format exercises.

HORT 42000 Ornamental Plant Production
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** The production courses were evaluated and two new courses will be taught to cover horticultural field crops and controlled environment production of horticultural crops. All horticulture majors will be required to take the two courses.

HORT 42100 Fruit Production
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** The production courses were evaluated and two new courses will be taught to cover horticultural field crops and controlled environment production of horticultural crops. All horticulture majors will be required to take the two courses.

HORT 42200 Vegetable and Herb Production
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.

**Impact on Learning Outcomes:** The production courses were evaluated and two new courses will be taught to cover horticultural field crops and controlled environment production of horticultural crops. All horticulture majors will be required to take the two courses.

HORT 42500 Landscape Horticulture Capstone
**Justification:** Enrollment expectation not meeting University mandated 15 student minimum per class.
**Impact on Learning Outcomes**: None. A new horticulture capstone has been created with flexibility to meet all the horticulture concentration expectations.

**HORT 42600 Landscape Contracting and Management Capstone Experience**
**Justification**: Enrollment expectation not meeting University mandated 15 student minimum per class.
**Impact on Learning Outcomes**: None. A new horticulture capstone has been created with flexibility to meet all the horticulture concentration expectations.

**HORT 44000 Public Garden Management**
**Justification**: Enrollment expectation not meeting University mandated 15 student minimum per class.
**Impact on Learning Outcomes**: None. A new horticulture capstone has been created with flexibility to meet all the horticulture concentration expectations.

**HORT 44500 Strategic Analysis of Horticultural Production and Marketing**
**Justification**: Enrollment expectation not meeting University mandated 15 student minimum per class.
**Impact on Learning Outcomes**: None. A new horticulture capstone has been created with flexibility to meet all the horticulture concentration expectations.

**HORT 49200 Horticultural Science Capstone Seminar**
**Justification**: Enrollment expectation not meeting University mandated 15 student minimum per class.
**Impact on Learning Outcomes**: None. A new horticulture capstone has been created with flexibility to meet all the horticulture concentration expectations.

**LA 10100 Survey of Landscape Architecture**
**Justification**: Course materials have been divided into two separate courses. A third of the course is now LA 16100 Land and Society which has been forwarded to the University Core Curriculum committee for approval as a Science, Technology and Society selective.
**Impact on Learning Outcomes**: None. LA 10100 course material will be covered in a new course LA 10110 as a 2 credit course and LA 16100 Land and Society, 1 credit. No reduction in the overall credit requirement in the LARC plan of study.

**B. COURSES TO BE ADDED**

**HORT 21810 Flowers for Color.** Sem. 1. Lab Prep 1, Lab 2, cr. 1. Meets first 8 weeks.
Survey of annual and tender/tropical perennial ornamentals commonly used for seasonal color programs and curb appeal; recognition; cultural requirements; and use in landscape plantings.
**Prerequisite**: None

**HORT 21820 Hardy Herbaceous Landscape Plants.** Sem. 1. Lec 2, cr. 2
Survey of hardy perennial herbaceous ornamentals including native and non-native species, bulbs, groundcovers, grasses, ferns, aquatics; recognition; cultural requirements; and use in landscape plantings.
**Prerequisite**: None

**HORT 31800 Field Production of Horticultural Crops.** Sem. 1. Lab Prep 2, Lab 3, cr. 3
A survey of the principles and practices of field production of horticultural crops: fruits, vegetables, herbs, and nursery crops. Production principles will be discussed in lectures while laboratory exercises will emphasize practical hands-on experience in modern technology of specialty crop production including management inputs, cultivar selection, crop manipulation, harvesting and handling.
**Prerequisite**: BIOL 11000, BTNY 11000 or HORT 10100

**HORT 31900 Controlled Environment Production of Horticultural Crops.** Sem. 2. Lab Prep 2, Lab 3, cr. 3.
This course combines production principles with environmental concepts and advances in technology to provide a comprehensive training in sustainable production of herbaceous ornamentals and vegetables in controlled environment systems. The laboratory instruction provides hands-on experience with the practice of growing crops under controlled environments by combining the learning from lectures with the use of technology to control environment during production.
**Prerequisite**: BIOL 11000, BTNY 11000 or HORT 10100
HORT 42700 Horticulture Capstone.  Sem. 1 and 2.  IND, cr. 1
Based on an approved work or internship experience, or case study, or mentored research experience, students will collect information and develop a written analytical exploration of the commercial enterprise, internship institution, or research activity. The written analysis will be appropriate to the student’s area of concentration. In addition, a summary oral presentation based on specific aspects of their experience will be made by each student.
Prerequisite: Completion of an approved work or internship experience or mentored research experience.

HORT 52500 The Plant Microbiome.  Sem. 2.  Lec 3, 3 cr.  Offered even-numbered years.
This course will provide an overview of the importance and complexity of the plant microbiome. Students will gain in-depth knowledge of plant-microbial relationships and how they interact to influence plant fitness and environmental health in natural and managed ecosystems. We will cover the latest methods to collect and analyze root and shoot exudates, quantify the composition and activity of microbes associating with plants, and determine how these associations influence plant health and productivity. Critical reviews of recent projects investigating the evolution and maintenance of plant-microbial relationships and how they can be manipulated to improve plant health and productivity will help students develop the skills needed to conduct research on this emerging topic.
Prerequisites: None.

LA 10110 Survey of Landscape Architecture.  Sem. 1.  Lec 2, cr. 2.
An overview of landscape architecture, this course provides students with their first introduction to the knowledge areas, skills, and abilities that form the foundation of the landscape architecture profession. The course offers a preview of the discipline for pre-landscape architecture and horticulture students while also providing general information for students across campus who have an interest in becoming familiar with landscape architecture.
Prerequisites: None

C. COURSES TO BE CHANGED

To: HORT 30100 Plant Physiology.  Sem. 2.

D. CURRICULAR CHANGES

Pre-Landscape Architecture Plan of Study
Current: Proposed:
Fall 1st Year Fall 1st Year
(3) LA 10100 Survey of Landscape Architecture (2) LA 10110 Survey of Landscape Architecture

Horticulture: Horticultural Production and Marketing (see plan of study for updated semester arrangement).

Removed: Proposed:
(3) Horticultural Production Selective (3) HORT 31800 Field Production of Horticultural Crops
(3) Horticultural Production Selective (3) HORT 31900 Controlled Environment Production of Horticultural Crops
(1) HORT 44500 Strategic Analysis of Horticultural Production and Marketing (1) HORT 42700 Horticulture Capstone Course

Horticulture: Plant Science (see plan of study for updated semester arrangement).

Removed: Proposed:

(3) Horticultural Production Selective

(3) Concentration Selective Horticultural Crops

(1) HORT 49200 Horticultural Science Capstone Seminar

(1) HORT 42700 Horticulture Capstone Course

**Horticulture: Public Horticulture (see plan of study for updated semester arrangement).**

**Removed:**

(2) LA 10100 Survey of Landscape Architecture

(3) ENTM 44600 Integrated Plant Health Management for Ornamental Plants

(3) HORT 21800 Herbaceous Landscape Plants

(1) HORT 44000 Public Garden Management

(1) LA 10100 Survey of Landscape Architecture

(1) HORT 31000 Plant Design Basics

(1) Elective

(1) UCC Science, Technology & Society Selective

**Proposed:**

(2) LA 10110 Survey of Landscape Architecture

(2) ENTM 20600 General Entomology Management for Ornamental Plants

(1) ENTM 20700 General Entomology Laboratory

(1) HORT 21810 Flowers for Color

(2) HORT 21820 Hardy Herbaceous Landscape Plants

(3) HORT 42000 Ornamental Plant Production

(1) HORT 44000 Public Garden Management

(3) HORT 31000 Plant Design Basics

(1) Elective

(1) UCC Science, Technology & Society Selective

**Horticulture: Landscape Enterprise Management (see plan of study for updated semester arrangement).**

**Removed:**

(3) LA 10100 Survey of Landscape Architecture

(3) ENTM 44600 Integrated Plant Health Management for Ornamental Plants

(3) HORT 21800 Herbaceous Landscape Plants

(3) HORT 31500 Landscape Design

(3) HORT 31600 Landscape Construction

(3) HORT 42000 Ornamental Plant Production

(1) HORT 44500 Strategic Analysis of Horticultural Production and Marketing

(1) UCC Science, Technology & Society Selective

**Proposed:**

(2) LA 10110 Survey of Landscape Architecture

(2) ENTM 20600 General Entomology Management for Ornamental Plants

(1) ENTM 20700 General Entomology Laboratory

(1) HORT 21810 Flowers for Color

(2) HORT 21820 Hardy Herbaceous Landscape Plants

(3) HORT 31500 Landscape Design

(3) HORT 31600 Landscape Construction

(3) HORT 31800 Field Production of Horticultural Crops

(3) HORT 31900 Controlled Environment Production of Horticultural Crops

(3) HORT 31800 Field Production of Horticultural Crops

(3) HORT 31900 Controlled Environment Production of Horticultural Crops

(3) HORT 31800 Field Production of Horticultural Crops

(1) HORT 42700 Horticulture Capstone Course

(1) LA 16100 Land and Society
**Horticulture: Landscape Contracting and Management (see plan of study for updated semester arrangement).**

**Removed:**
1. HORT 22300 AutoCAD Applications in Horticulture
2. LA 10100 Survey of Landscape Architecture
3. ENTM 44600 Integrated Plant Health Management for Ornamental Plants
4. HORT 21800 Herbaceous Landscape Plants
5. HORT 3150 Landscape Design
6. HORT 31600 Landscape Construction
7. HORT 42000 Ornamental Plant Production
8. Elective
9. UCC Science, Technology & Society Selective

**Proposed:**
1. LA 10110 Survey of Landscape Architecture
2. LA 10110 Survey of Landscape Architecture
3. LA 11600 Graphic Communication for Landscape Architects and Design
4. HORT 21810 Flowers for Color
5. HORT 21820 Hardy Herbaceous Landscape Plants
6. LA 21600 Landscape Architecture Design
7. LA 24600 Site Systems
8. HORT 31800 Field Production of Horticultural Crops
9. HORT 42700 Horticulture Capstone Course
10. LA 16100 Land and Society

**Horticulture: Landscape Design (see plan of study for updated semester arrangement).**

**Removed:**
1. HORT 22300 AutoCAD Applications in Horticulture
2. LA 10100 Survey of Landscape Architecture
3. Elective
4. UCC Science, Technology & Society Selective

**Proposed:**
1. LA 10110 Survey of Landscape Architecture
2. LA 10110 Survey of Landscape Architecture
3. LA 11600 Graphic Communication for Landscape Architects and Design
4. LA 21600 Landscape Architecture Design I
5. LA 24600 Site Systems
6. HORT 31900 Controlled Environment Production of Horticultural Crops
7. LA 16100 Land and Society
8. HORT 42700 Horticulture Capstone Course
Project

(1) HORT 42500 Landscape Design Capstone
(2) Elective
(3) HORT 31900 Controlled Environment Production of Horticultural Crops
Supporting Documentation

Semester(s) Offered:  Fall (Meets first eight (8) weeks)

Schedule Type and Hours:  Lab Prep (LBP) - 1/Laboratory (LAB) – 2

Credit(s):  1

Course Title: HORT 21810: Flowers for Color

A. Justification for the course:
This course is intended to provide both horticulture majors and non-major undergraduate students with knowledge of the range of annual and tender perennial (functionally annual) ornamental plants that are available for use in landscape color programs in all types of settings; residential, civic, commercial and institutional. It is separated out from the herbaceous perennial landscape plant group for two primary reasons. Landscape architecture students do not require awareness of this plant group, and students from a variety of majors may take this course as an elective which will facilitate the course meeting the expected minimum enrollment requirement. This course will serve as a replacement for a portion of the material previously taught in HORT 21800.

B. Outcomes:
Will the course be nominated for inclusion on a University Foundational Core or COA Core course List:  No

College Learning Outcomes Addressed by this Course:
___x Professional Preparation: Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.
___x Civic Responsibility: Demonstrate awareness of civic responsibility to community and society at large.

Specific Learning Outcomes:
This course will provide students awareness of the palette of tender herbaceous ornamental plants with the following outcomes:
• Ability to identify basic herbaceous ornamental plants on sight.
• Use proper nomenclature with these taxa.
• Be familiar with the cultural requirements for these taxa.
• Be able to design planting layouts that reflect appropriate design criteria.

Methods of evaluation or assessment:

<table>
<thead>
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<th>Methods of assessment</th>
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<tr>
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<tr>
<td>2. assessment and scoring of in class participation</td>
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<tr>
<td>3. assignments</td>
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<td>4. class presentations</td>
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<tr>
<td>5. Other (specify): Design Portfolio, Image Gallery</td>
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Example of a Course Syllabus

**Syllabus:** HORT 21810 Flowers for Color  
**Credits:** 1 credit, 8 weeks. One 50-minute lecture per week, 2 lab hours per week, Arranged.

**Instructor:**  
Michael Dana, office: 205 HORT, dana@purdue.edu

**Overview:**  
HORT 21810 Flowers for Color will focus on the tender herbaceous ornamental plants that are commonly used to enhance site quality via plant color richness and diversity. In part, it will help student develop a working ability to recognize and apply proper nomenclature to the plants in this group. In addition, students will be challenged to make plant selection and planting decisions based on horticultural criteria and common design principles.

**Lecture:**  
Lecture time will be used to lay the foundation in plant nomenclature, identification techniques and floral structure, and to share relevant examples of landscape usage. Near the end of the eight week period, some lecture periods will be utilized for students to share their design projects with peers. It will also be the time used for testing.

**Laboratory:**  
Laboratory time will be self-managed by the students. Pre-recorded narratives about each taxon will be made available via computer and mobile device along with an easy-to-use map locational app to allow students to navigate the plant collection located in the Purdue Horticulture Garden and throughout the campus. Each student will visit each example plant, listen to the narrative, and complete the picture taking and uploading activity.

**Grading:**  
Grades will be based entirely on cumulative points earned for the various activities.

**Possible Points**  
<table>
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<th>Points</th>
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<td>Image Gallery</td>
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<tr>
<td>Design Portfolio</td>
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<tr>
<td>Final exam</td>
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**Grading Scale:**  

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<th>GPA Value</th>
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**Required Text:**  
Prepared laboratory study guide

**Class Schedule:**  

*Week 1 – Introduction, course app*  
*Week 1 Lab – Self-study, 10 Tropical taxa, input images to gallery*
Week 2 – Nomenclature, floral structure
Week 2 Lab – Self-study, 5 Tropical taxa, 5 vines, input images to gallery

Week 3 – Usage in Curb Appeal
Week 3 Lab – Self-study, 10 Tender taxa, input images to gallery

Week 4 – Recognition Test 1
Week 4 Lab – Self-study, 10 Tender taxa, input images to gallery

Week 5 – Usage in Containers
Week 5 Lab – Self-study, 10 Tender taxa, input images to gallery

Week 6 – Recognition Test 2
Week 6 Lab – Self-study, 10 Tender taxa, input images to gallery

Week 7 – Peer review of image galleries
Week 7 Lab – Self-study, 10 Tender taxa, input images to gallery

Week 8 – Recognition Test 3
Week 8 Lab – Local field trip

Attendance:
The resources of Purdue University are provided for the intellectual development of its students. Courses with defined schedules are provided to facilitate an orderly and predictable environment for learning, as well as to provide assurance of a registered student's right to access the course. Scheduled courses allow students to avoid conflicts and reflect the University's expectation that students should be present for every meeting of a class/laboratory for which they are registered. Faculty are responsible for organizing and delivering a course of instruction and for certifying student accomplishment on the basis of performance.

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Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.
Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Purdue’s Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its affirmative action program.

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- If we are notified of a Shelter in Place requirement for a hazardous materials release we will shelter in our classroom shutting any open doors and windows.
- If we are notified of a Shelter in Place requirement for a civil disturbance such as a shooting we will shelter in a room that is securable preferably without windows. Our preferred location is in the lecture hall.

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Supporting Documentation

Semester(s) Offered: Fall
Schedule Type (e.g. Lecture/Lab) and Hours: Lecture (LEC) - 2
Credit(s): 2

Course Title: HORT 21820: Hardy Herbaceous Landscape Plants

A. Justification:
This course is intended for students of horticulture, landscape architecture and other majors who will need to have a working knowledge of this plant palette in their professional careers. The hardy perennial species are separated out from the tender material (see HORT 21810 proposal) to reduce the credit amount and thus make it accessible to landscape architecture students as a recommended elective given that they have very little elective space in their plan of study. The range of hardy plant material types addressed in this course is broadened from the former 21800, with expansion into native species used to create naturalistic landscapes. Success in attracting landscape architecture students to this elective will help meet the expected minimum enrollment requirement.

B. Outcomes:
Will the course be nominated for inclusion on a University Foundational Core or COA Core course List: No

College Learning Outcomes Addressed by this Course:
___ x Professional Preparation: Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.
___ x Teamwork: Demonstrate the ability to work effectively as part of a problem-solving team.

Specific Learning Outcomes:
This course will provide students awareness of the palette of hardy herbaceous ornamental plants with the following outcomes:
- Ability to identify basic herbaceous ornamental plants on sight.
- Use proper nomenclature with these taxa.
- Be familiar with the cultural requirements for these taxa.
- Be able to design planting layouts that reflect appropriate design criteria.

Methods of evaluation or assessment:

<table>
<thead>
<tr>
<th>Methods of assessment</th>
<th>Check all that apply</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3. assignments</td>
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<td>4. class presentations</td>
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<tr>
<td>5. Other (specify): Click here to enter text.</td>
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</tbody>
</table>
Example of a Course Syllabus

Syllabus: HORT 21820 Hardy Herbaceous Landscape Plants

Credits: 2 credits, 16 weeks. Two 50-minute classes each week.

Instructor:
Michael Dana, office: 205 HORT, dana@purdue.edu

Overview:
Herbaceous plants are an important component of planting design and can turn an average landscape into an extraordinary one. They are visually dynamic and add a temporal component to the landscape. They have certain personalities that need to be understood in order for them to thrive. This course focuses on aspects of hardy herbaceous plants: recognition, cultural requirements, unique design characteristics and their place in the landscape. Learning will be centered on the creation of a notebook/database which will serve as a professional resource and as the basis for life-long learning.

Learning Objectives:
This course will provide students experience in field production of horticulture crops with the following goals:
• Build confidence designing with perennials and native herbaceous plant material
• Gain a greater understanding of prairie plants and Indiana native plant communities
• Develop an understanding of how herbaceous materials can add depth to you planting designs
• Learn to distinguish plants cultural requirements and design within the scope of those needs
• Communicate using a plant-based vocabulary, using both the botanical and common name

Notebook/Database:
You will create a notebook/database of the plants you are introduced to in class. From each list you will choose a minimum of 5 plants to be included in your notebook - each from a unique genus. You will be provided a database template on Excel that includes the plants we will be covering in class and it is your responsibility to add the information as given in class or from another trusted source. You must provide three visuals of the plant, one depicting the plant in bloom, one showing the form, and the other a close up of the leaf or flower.

Team Project:
Teams of students will assemble and critique cultivar range, availability, and utilization information from numerous sources from the literature and the commercial plant industry and make a presentation to the class about their findings and evaluation.

Grading:
Completion of all requirements listed below will provide a point total which will be calculated as a percentage and assigned appropriate letter grades as indicated in the table.

Tests 200 points
Notebook 200 points
Team project 50 points
Participation 50 points
Total 500 points

Grading Scale: Grading in this course will employ the “plus-minus” system as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range (%)</th>
<th>GPA Value</th>
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</thead>
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<td>4.0</td>
</tr>
<tr>
<td>A</td>
<td>93.0 - 96.9</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>90.0 - 92.9</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>87.0 - 89.9</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>83.0 - 86.9</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>80.0 - 82.9</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>77.0 - 79.9</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>73.0 - 76.9</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>70.0 - 72.9</td>
<td>1.7</td>
</tr>
</tbody>
</table>
D+      67.0 - 69.9  1.3
D        63.0 - 66.9  1.0
D-       60.0 - 62.9  0.7 (lowest passing grade)
F        <60.0      0.0

Sample Course Schedule

Week hour

1.1  Course Introduction, overview of hardy herbaceous plants
1.2  Campus exploration of self-study technology

2.1  Local site review 1
2.2  Local site review 2

3.1  Local site review 3
3.2  Local site review 4

4.1  Plant List 1
4.2  Plant List 2

5.1  Plant List 3
5.2  Plant List 4

6.1  Plant List 5
6.2  Plant List 6

7.1  Notebook review
7.2  Test

8.1  October
8.2  Break

9.1  Guest lecturers
9.2  Video field trip

10.1 Team cultivar presentations
10.2 Plant List 7

11.1 Team cultivar presentations
11.2 Plant List 8

12.1 Team cultivar presentations
12.2 Plant List 9

13.1 Team cultivar presentations
13.2 Plant List 10

14.1 Thanksgiving week
14.2 No class

15.1 Plant List 11
15.2 Plant List 12

16.1 Notebook review
16.2 Test

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Supporting Documentation

Semester(s) Offered:  Fall
Schedule Type (e.g. Lecture/Lab) and Hours:  Lab Prep (LBP) - 2/Laboratory (LAB) - 3
Credit(s):  3
Course Title: HORT 31800: Field Production of Horticultural Crops

A. Justification
This course is designed to provide undergraduate students with knowledge of the wide range of production technologies used by the specialty crop industry. Lectures will focus on principles of production while the labs will focus on practice. This course will serve as a replacement for courses previously taught: Hort 401 Horticulture Production Technology, Hort 421 Fruit Production, Hort 422 Herb and Vegetable Production and the nursery crop portion of Hort 420 Ornamental Plant Production. A companion course will focus on principles of production of horticultural crops in Controlled Environments.

B. Outcomes:
Will the course be nominated for inclusion on a University Foundational Core or COA Core course List:  No.

College Learning Outcomes Addressed by this Course:

- **Professional Preparation:** Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.
- **Critical Thinking:** Demonstrate critical thinking by using data and reasoning to develop sound responses to complex problems.
- **Communication:** Demonstrate the ability to write and speak with effectiveness while considering audience and purpose.
- **Teamwork:** Demonstrate the ability to work effectively as part of a problem-solving team.
- **Lifelong Learning:** Demonstrate skills necessary for lifelong learning.

Specific Learning Outcomes:
This course will provide students experience in field production of horticulture crops with the following goals:

- Learn how horticultural crops are produced at various farm sizes for direct-to-consumer production and marketing, and commercial production for wholesale markets and processing.
- Interact with industry leaders in the commercial horticulture industry.
- Become familiar with the requirements for certified organic production.
- Compare and contrast various approaches to maximize production, including breeding and biotechnology.
- Integrated crop management principles in planning a successful horticultural crop enterprise including site selection, climate, soil management, fertilization, cultivar selection, pest management genetics and other disciplines.

Students will learn critical thinking and teamwork skills through small group Cooperative Learning Exercises. Students will improve their written and oral communication and critical thinking skills through assignments and the term project, and gain lifelong learning skills through the process of peer reviewing another student’s term projects. Students will experience professional preparation through interactions with industry leaders.

Methods of evaluation or assessment:

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Example of a Course Syllabus

Syllabus: HORT 31800
Course Name: Field Production of Horticultural Crops
Credits: 3 credits, 16 weeks. Two 50-minute lectures and one 3-hour lab each week.

Instructors:
*Stephen Weller, Professor of weed science and vegetable production, Office: Hort 315, weller@purdue.edu
Bruce Bordelon, Professor of viticulture and small fruit, Office: HORT 109, bordelon@purdue.edu
Kyle Daniel, Extension Specialist for nursery crops, Office: Hort 312, daniel38@purdue.edu
Peter Hirst, Professor of pomology, Office: HORT 317, hirst@purdue.edu
*Lead instructor

Overview:
HORT 31800, Field Production of Horticultural Crops, will focus on the principles and practices of sustainable fruit, vegetable, herb, and nursery crop production. By understanding of principles, and active participation in labs, students will learn to integrate knowledge and become prepared for the job market after graduation.

Learning Objectives and Method of Evaluation or Assessment:
This course will provide students experience in field production of horticulture crops with the following goals:
• Learn how horticultural crops are produced at various farm sizes for direct-to-consumer production and marketing, and commercial production for wholesale markets and processing.
• Interact with industry leaders in the commercial horticulture industry.
• Become familiar with the requirements for certified organic production
• Compare and contrast various approaches to maximize production, including breeding and biotechnology.
• Integrated crop management principles in planning a successful horticultural crop enterprise including site selection, climate, soil management, fertilization, cultivar selection, pest management genetics and other disciplines.

Lectures and Labs: This class will be taught in a combination of lectures, labs and discussions. The course lectures will focus on principles of production and be discussion-based, supplemented with slide presentations on Blackboard, handouts, and guest speakers. Students will be assigned reading prior to each class to prepare them for discussion. Discussions will be based on a Cooperative Learning model, where students will work in small groups to address issues and propose solutions as part of their assignments. Laboratory exercises and field experience at the Meigs Horticulture Research Farm and Purdue Student Farm will build on the principles discussed in class and provide practical, hands-on experiential learning. Field trips to visit local producers will supplement laboratory exercises and prepare students professionally.

Students are expected to fully participate in all class activities.

Grading:
Students will be required to complete ten quizzes and assignments, each worth 10 points, based on material covered in lecture, labs and Cooperative Learning exercises. Students will also be required to prepare a term project (90 points), and will provide a peer review (10 points) of another student’s paper. The peer review will not factor into the grade of the paper being evaluated. There will be a final exam (100 points).

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<thead>
<tr>
<th>Component</th>
<th>Points</th>
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<tr>
<td>Term project</td>
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<td>Peer review</td>
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<tr>
<td>Final exam</td>
<td>100</td>
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<tr>
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Grading Scale: Grading in this course will employ the “plus-minus” system as follows:

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<td>B+</td>
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</table>
Term project and peer review:
Students will select or be assigned a semester-long project to develop a successful horticultural crop enterprise. Students will use available class, reference materials and internet sources for information necessary to design a specialty crop production operation. The project will involve selection of specific crops to be grown, site and soils of location, crop management plan for soil management, nutrition, irrigation, pest management, harvesting, postharvest handling and anticipated market. Term projects will be due in Week 12. In Week 13 each student will receive another student’s project to peer review. The written evaluation summary of another student’s paper will be worth 10 points. Reviews will need to be no more than half a page, and criteria on which to base the evaluation will be provided by the instructors. The peer review will not factor into the grade of the paper being evaluated.

Required text:
None

Supplemental books and readings:
Several resources will be used in this class including "Midwest Vegetable Production Guide" ID-56 (2017); “Midwest Fruit Pest Management Guide”, ID-465 (2017); Midwest Small Fruit Pest Management Handbook, OSU-861 (2004); Midwest Grape Production Guide, OSU-919 (2005); Midwest Strawberry Production Guide, OSU-926 (2006); Midwest Blueberry Production Guide, UK ID-210 (2013); Midwest Tree Fruit Pest Management Handbook, UK ID-93 (1998); other texts and resources are available online and some will be distributed in class along with lecture materials.

Communication:
Students will be contacted via email and Blackboard about assignments, class discussion topics, cancellations, etc.

Detailed Syllabus-Draft:

Week 1 – Syllabus, Course Outline, Objectives, Term project, Discussion of crops covered in the course, Overview of the industries and production technologies, history, past and current importance of vegetables and fruit, current trends and future opportunities.
Week 1 Lab – Overview of Meigs Horticulture Research Facility; Irrigation systems, soils, nutrient management, planting design, mechanization, sprayers, pesticide handling, etc.

Week 2 – Cucurbitaceae and Fabaceae crops
Week 2 Lab – Basics of seed selection, planting and growing a vegetable crop

Week 3 – Berry crop production
Week 3 Lab – Berry crop production: primocane fruiting raspberries and blackberries

Week 4 – Grape production: site selection, varieties, training systems, integrated pest management, harvest parameters
Week 4 Lab – Grape production: canopy management, evaluation of fruit quality

Week 5 – Solanaceae, Liliaceae, Lamiacae crops
Week 5 Lab – Melon, tomato and pepper production systems

Week 6 – Sweet corn and Brassicaceae crops
Week 6 Lab – Field trip to tomato and sweet corn production field
Week 7 – Tree fruit production, harvesting and storage.
Week 7 Lab – Tree fruit production: rootstock effects, tree form and function

Week 8 – Herbs, ethnic and medicinal vegetables crops
Week 8 Lab – Fall production of vegetable crops

Week 9 – Nursery crop production systems
Week 9 Lab – Container nursery production: container design, pot-in-pot, media

Week 10 – Produce marketing, food safety
Week 10 Lab – Field trip to a local nursery

Week 11 – Sod production for turf
Week 11 Lab – Field trip to a local sod farm

Week 12 – Principles of pruning fruit crops. Term projects due
Week 12 Lab – Pruning and training apples, peaches, grapes, brambles and nursery crops

Week 13 – Nursery layout and irrigation. Term project peer review due
Week 13 Lab – Field nursery production: planting and harvesting

Week 14 – Principles of Organic production, USDA standards
Week 14 – Thanksgiving break, no lab.

Week 15 – Presentations of term projects
Week 15 Lab – Course review

Attendance:
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Academic Integrity:
From Stephen Akers, Executive Associate Dean of Students (https://www.purdue.edu/odos/academic-integrity/): Purdue University values intellectual integrity and the highest standards of academic conduct. To be prepared to meet societal needs as leaders and role models, students must be educated in an ethical learning environment that promotes a high standard of honor in scholastic work. Academic dishonesty undermines institutional integrity and threatens the academic fabric of Purdue University. Dishonesty is not an acceptable avenue to success. It diminishes the quality of a Purdue education, which is valued because of Purdue's high academic standards.
Fostering an appreciation for academic standards and values is a shared responsibility among students, faculty, and staff. The information in this brochure is directed to students to define academic dishonesty and how to avoid it.

**Definition of Academic Dishonesty:**
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More specifically, the following are a few examples of academic dishonesty that have been discovered at Purdue University.

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- fabricating data
- destroying or stealing the work of other students

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- using the exact language of someone else without the use of quotation marks and without giving proper credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment submitting a document written by someone else but representing it as one's own

**Nondiscrimination Policy Statement:**
Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders.
and in conformance with the procedures and limitations as set forth in Purdue’s Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its affirmative action program.

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- If we hear a fire alarm we will immediately evacuate the building by directly exiting outside through the door at the front right of the room.
- If we are notified of a Shelter in Place requirement for a tornado warning we will shelter in the lowest level of this building away from windows and doors. Our preferred location is the basement. We will proceed out of the lecture room entrance (the door you come in) and take the stairs into the basement. Once in the basement, proceed to the end of the hallway to accommodate other people coming down the stairs.
- If we are notified of a Shelter in Place requirement for a hazardous materials release we will shelter in our classroom shutting any open doors and windows.
- If we are notified of a Shelter in Place requirement for a civil disturbance such as a shooting we will shelter in a room that is securable preferably without windows. Our preferred location is in the lecture hall.


When harsh weather is a possibility, Purdue administrators continuously monitor forecasts to ensure public safety. The university uses several systems to alert the campus community about weather-related changes to class schedules or work hours, starting with the Purdue home page. For more information on weather preparedness: http://www.purdue.edu/newsroom/health_safety/weather.html
Supporting Documentation

Semester(s) Offered: Spring
Schedule Type (e.g. Lecture/Lab) and Hours: Lab Prep (LBP) - 2/Laboratory (LAB) - 3
Credit(s): 3
Course Title: HORT 31900: Controlled Environment Production of Horticultural Crops

A. Justification
This course is designed to provide undergraduate students with knowledge of the wide range of controlled environment production technologies used by the specialty crop industry. Lectures will focus on principles of production combined with environmental concepts and advances in technology while the labs will focus on practice of growing crops in controlled environments by measuring and controlling above and below ground environments. A companion course will focus on principles of production of horticultural crops under field conditions.

This course will replace courses previously taught: HORT 401 Horticulture Production Technology, HORT 422 Herb and Vegetable Production and the greenhouse crop portion of HORT 420 Ornamental Plant Production.

B. Outcomes:
Will the course be nominated for inclusion on a University Foundational Core or COA Core Course List: No

College Learning Outcomes Addressed by this Course:
- [x] Professional Preparation: Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.
- [x] Critical Thinking: Demonstrate critical thinking by using data and reasoning to develop sound responses to complex problems.
- [x] Communication: Demonstrate the ability to write and speak with effectiveness while considering audience and purpose.
- [x] Teamwork: Demonstrate the ability to work effectively as part of a problem-solving team.
- [x] Lifelong Learning: Demonstrate skills necessary for lifelong learning.

Specific Learning Outcomes:
This course will provide students experience in controlled environment production of specialty crops with the following goals:
- Become familiar with best management practices for growing herbaceous ornamentals and vegetables that improve sustainability in controlled environments.
- Learn how above and below ground environments interact with crop production.
- Learn basics about the state-of-the art technologies used in controlled environment agricultural production to monitor and control environments.
- Interact with industry professionals to gain first-hand knowledge about careers and development in commercial horticulture.
- Gain sufficient background in science, technology and regulations required to become entrepreneurs, next generation growers and researchers in the controlled environment agriculture industry.

Students will learn critical thinking and teamwork skills through small group Collaborative Learning Exercises. Students will improve their written and oral communication and critical thinking skills through assignments and the term project, and gain lifelong learning skills through the process of peer reviewing another student’s term projects. Students will experience professional preparation through interactions with industry leaders, mastering production principles that are coupled with sound environmental management and experiencing the state-of-the art technologies used in the industry.
Methods of evaluation or assessment:

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<thead>
<tr>
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<th>Check all that apply</th>
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<tbody>
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<td>1. exams and quizzes</td>
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<td>2. assessment and scoring of in class participation</td>
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<td>3. assignments</td>
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Example of a Course Syllabus

Syllabus: HORT 31900 (Spring)

Course Name: Controlled Environment Production of Horticultural Crops
Credits: 3 credits, 16 weeks. Two 50-minute lectures and one 2-hour lab each week.

Instructors:
* Krishna Nemali, Assistant Professor, Controlled Environment Agriculture, Office: Hort 109B, knemali@purdue.edu
Cary Mitchell, Professor, Plant Physiology & Controlled Environment Agriculture, HORT 109A, cmitchel@purdue.edu
* Lead instructor

Overview:
HORT 31900, Controlled Environment Production of Horticultural Crops, will focus on the sustainable practices for growing herbaceous ornamentals (plugs, bedding plants in containers, potted chrysanthemums and poinsettias, bulbs and perennials) and vegetables (lettuce, tomato, pepper, herbs and microgreens) in controlled environments. The course will combine the concepts of environmental physiology with advanced sensing technologies used in controlled environment production. By understanding of principles and concepts, and active participation in labs, students will learn to integrate knowledge and practice to become next generation growers and researchers who are well trained with sustainable practices and modern technology.

Learning Objectives and Method of Evaluation or Assessment:
This course will provide students experience in controlled environment production of specialty crops with the following goals:
• Become familiar with best management practices for growing herbaceous ornamentals and vegetables that improve sustainability in controlled environments
• Learn how above and below ground environments interact with crop production.
• Learn basics about the state-of-the art technologies used in controlled environment agricultural production to monitor and control environments.
• Interact with industry professionals to gain first-hand knowledge about careers and development in commercial horticulture.
• Gain sufficient background in science, technology and regulations required to become entrepreneurs, next generation growers and researchers in the controlled environment agriculture industry

Lectures and Labs:
This class will be taught in a combination of lectures, labs and discussions. The course lectures will focus on principles of production and be discussion-based, supplemented with slide presentations on Blackboard, handouts, and guest speakers. Students will be assigned reading prior to each class to prepare them for discussion. Discussions will be based on a Collaborative Learning model, where students will work in small groups to address issues and propose solutions as part of their assignments. Laboratory exercises will build on the principles discussed in class and provide practical, hands-on experiential learning. Students will experience the benefits of using state-of-the art technology used in controlled environment agriculture. Field trips to visit local producers will supplement laboratory exercises and prepare students professionally.

Students are expected to fully participate in all class activities.
Grading:
Students will be required to complete ten quizzes and lab assignments, each worth 10 points, based on material covered in lecture, labs and Collaborative Learning exercises. Students will also be required to prepare a term project (90 points), and will provide a peer review (10 points) of another student’s paper. The peer review will not factor into the grade of the paper being evaluated. There will be a final exam (100 points).

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<td>3.3</td>
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<td>B</td>
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<td>B-</td>
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Term Project and Peer Review:
Students will select or be assigned a semester-long project to develop a successful controlled environment production system that uses state-of-the art technology and result in sustainable use of resources including water, fertilizer, energy and natural gas. Students will work in groups of 4 to 5. They will use available class, reference materials and internet sources for information necessary to design a specialty crop production operation. The project will involve selection of specific crops to be grown, production system (ex: hydroponics, sub-irrigation, energy efficient lighting etc.), monitoring and controlling environment and utilizing best management practices during production. Term projects will be due in Week 14. In Week 15, each group of student will receive another student group’s project to peer review. The written evaluation summary of another student group’s paper will be worth 10 points. Reviews will need to be no more than a page, and criteria on which to base the evaluation will be provided by the instructors. The peer review will not factor into the grade of the paper being evaluated.

Required Text:
None

Supplemental Books and Readings:
1. Greenhouse Operation and Management (5th or 7th edition) by Paul V. Nelson
2. Taiz and Zieger, Plant Physiology, 3rd or 4th ed.
3. http://4e.plantphys.net/ (Companion web site for Taiz and Zieger’s Plant Physiology book
5. Controlled Environment Agriculture Center, Univ. Arizona website: http://ceac.arizona.edu/

Communication:
Students will be contacted via email and Blackboard about assignments, class discussion topics, cancellations, etc.

Detailed Syllabus-Draft:
Lectures:
Week 1. Introductions, course objectives & expectations, course material, ethics and exams & grading, meet industry professionals, history of controlled environment agriculture

Week 2. Greenhouse/warehouse construction: location, orientation, roofing materials, shapes, benches, containers and carriers

Week 3: Introduction to various production systems: hydroponics, pot culture, aeroponics, and aquaponics

Week 4: Substrates: types of soilless substrates, components, physico-chemical properties of soilless substrates

Week 5: Fertilizers: mineral nutrition concepts, measuring fertilizer status of the substrate: electrical conductivity and pH

Week 6: Fertilizers: nutrient deficiency and toxicity symptoms, fertilizer runoff and leaching, environmental issues and regulations

Week 7: Temperature: Concepts and measurement, influence of canopy and root temperature on plant growth, greenhouse heating and cooling systems

Week 8: Light: concepts, light quality, quantity & duration, supplemental lighting systems, light measurements and units

Week 9: Light: effects on photosynthesis under controlled environments, CO2 fertilization in greenhouses, light quality induced responses in plants

Week 10: Water: substrate-plant-atmosphere water relations under controlled environments, sources of water for irrigation, irrigation efficiency, greenhouse irrigation systems

Week 11: Water: measuring substrate and plant water status, water quality/alkalinity and environmental issues

Week 12: Plant propagation-seeding & cuttings, types of plant growth regulators, greenhouse insect & diseases, scouting for pests

Week 13: Best management practices for plugs, potted bedding plants, poinsettias, chrysanthemums

Week 14: Best management practices for Easter lilies, bulbs, perennials

Week 15: Best management practices for lettuce, basil, and microgreens

Week 16: Best management practices for greenhouse grown tomato and pepper

Labs:

Week 1 (Assignment 1): Determining moisture retention curves, porosity, container capacity and plant available water in soilless substrates

Week 2 (Assignment 2): Fertilizer calculations, EC and pH measurement and monitoring.

Week 3 (Assignment 3): Identifying nutrient deficiencies.

Week 4 (Assignment 4): Temperature sensors, heating and cooling calculations.


Week 6 (Assignment 6): Measuring light quantity and quality effects on leaf photosynthesis.

Week 7 (Assignment 7): CO2 fertilization, effect on leaf photosynthesis.

Week 8 (Assignment 8): Soil moisture sensors, measuring substrate water content, measuring plant water status using infrared thermography.

Week 9 (Assignment 9): Comparison of different plant growth regulators.

Week 10 (Assignment 10): Scouting for insects and diseases, physiological disorders.

Week 11 - 14: Setup controlled environment production system/crop for term project, monitor and control production environment and harvest crops after 4 weeks.

Week 15: Visit other group projects, complete term project peer review.

Week 16: Oral presentations on term projects.

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Supporting Documentation

Semester(s) Offered: Fall and Spring

Schedule Type (e.g. Lecture/Lab) and Hours: Individual Study (IND) - 1

Credit(s): 1

Course Title: HORT 42700: Horticulture Capstone

A. Justification
Consolidation of capstone experiences and requirements across Horticulture concentrations will provide an improved forum for idea and experience exchange among horticulture majors. It is also necessary to meet anticipated enrollment minima.

B. Outcomes:
Will the course be nominated for inclusion on a University Foundational Core or COA Core Course List: No.
Will the course be nominated for inclusion on the College of Agriculture Capstone Course List: Yes.

College Learning Outcomes Addressed by this Course:

- [x] Professional Preparation: Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.
- [x] Critical Thinking: Demonstrate critical thinking by using data and reasoning to develop sound responses to complex problems.
- [x] Communication: Demonstrate the ability to write and speak with effectiveness while considering audience and purpose.

Specific Learning Outcomes:

Students will be able to:
- Describe the structure and operation of a horticultural enterprise, public horticultural institution or the methodology for hypothesis testing in research
- Give examples of strengths and weaknesses of a horticultural enterprise, public horticultural institution or the methodology used in the research project
- Apply principles learned in coursework to evaluation of the observed horticultural enterprise, public horticultural institution or the methodology used in the research project including the management, operational, or horticultural setting and strategies
- Formulate proposals for ways in which the observed horticultural enterprise, public horticultural institution or the research activity might improve.

Methods of evaluation or assessment:

<table>
<thead>
<tr>
<th>Methods of assessment</th>
<th>Check all that apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. exams and quizzes</td>
<td></td>
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<td>2. assessment and scoring of in class participation</td>
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<tr>
<td>3. assignments</td>
<td></td>
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<tr>
<td>4. class presentations</td>
<td></td>
</tr>
<tr>
<td>5. Other (specify): Written and Oral Reports</td>
<td>X</td>
</tr>
</tbody>
</table>
Example of a Course Syllabus
The following is the syllabus from the extant HORT 42600 Landscape Contracting and Management Capstone Experience. It is an example of the current nature of the student experience in each of the concentration areas. The new student experience for the Landscape Design concentration will be similar with the substitution of a design emphasis over a contracting and management emphasis in the work experience.

HORT 42600 Landscape Contracting & Management Capstone Experience
Instructor: Michael Dana
Office: 205 HORT
Phone: 765-494-5923
Email: dana@purdue.edu

Course Information
Offered Fall and Spring
Meeting times, days arranged
Class Location: TBA
This syllabus is subject to change.

Course Description
This course is an analytical and reflective follow-on to an approved company- and job-shadowing of a working landscape contracting and management industry company and individual professionals within the company. The information gathering about the company and the roles of various professionals therein will occur during the work experience required of all Landscape Contracting and Management students. The student is required to collect information about the company being studied, submit a comprehensive written report describing and critiquing overall operation and management at the company studied and deliver an oral presentation focused on the student’s personal experience during the work experience or shadowing exercise.

In the case of a student meeting the work experience via their own company, the company- and job-shadowing will take place with a different cooperating company on a minimum of five full days during the semester preceding when the student registers for this capstone course.

Prerequisites
An enrollee must have completed an approved landscape contracting and management work experience (minimum 320 hours).

Course Goals & Objectives
1. Gain greater appreciation of the variation of operational methods and styles among businesses in the landscape contracting and management discipline.
2. Think critically about the company’s business and landscape operations.
3. Improve their articulation of ideas verbally including supporting them with evidence.
4. Improve their thoughtful and critical writing.

Learning Outcomes
Students will be able to:
1. Describe the structure and operation of a landscape design or design/build company
2. Give examples of strengths and weaknesses in aspects of the operation of a landscape design or design/build company
3. Apply principles learned in coursework to evaluation of the observed company in the areas of sales, management and marketing.
4. Formulate proposals for ways in which the observed company might improve their operation.

Course Requirements
Conduct company- and job-shadowing of a working landscape contracting and management industry company and individual professionals within the company. The aspects of the business and operations to be studied, at a minimum, are:
- Basic business operations
- Sales
- Project estimating
- Project management
- Human resources
Prepare a comprehensive written report about the company and the operational roles played by key professionals therein.

A seminar series will be scheduled wherein each participating student will present their oral presentation related to their capstone experience. The written report is to be completed by Friday of the last week of classes. All Landscape Contracting and Management students, whether enrolled in HORT42600 or not, are strongly encouraged to attend all oral presentations. In this way, students will learn about other companies besides those for which a student may have worked.

**Class Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Each student meets individually with instructor / faculty mentor</td>
</tr>
<tr>
<td>5</td>
<td>Student and mentor review and discuss draft outline of paper</td>
</tr>
<tr>
<td>6-10</td>
<td>Individual student mentor meetings for review of drafts (oral/paper)</td>
</tr>
<tr>
<td>11-15</td>
<td>Oral presentations</td>
</tr>
<tr>
<td>16</td>
<td>Written paper due</td>
</tr>
</tbody>
</table>

**Required Texts**

None required.

**Course Policies**

**Grading**

Final grades will be calculated as total points earned divided by total points possible for the entire semester, with letter grades based on the scale at right:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percent Range</th>
<th>GP</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>93-100</td>
<td>4.0</td>
</tr>
<tr>
<td>A</td>
<td>90.0-92.9</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>87.0-89.9</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>83.0-86.9</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>80.0-82.9</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>77.0-79.9</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>73.0-76.9</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>70.0-72.9</td>
<td>1.7</td>
</tr>
<tr>
<td>D+</td>
<td>67.0-69.9</td>
<td>1.3</td>
</tr>
<tr>
<td>D</td>
<td>63.0-66.9</td>
<td>1.0</td>
</tr>
<tr>
<td>D-</td>
<td>60.0-62.9</td>
<td>0.7</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 60.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**Assignments with Points Possible:**

- Term paper ............... 200 points
- Oral presentation ........... 100 points
- Total ..................... 300 points

**Course Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student meet as a group with supervising faculty</td>
</tr>
<tr>
<td>2</td>
<td>Each student meets individually with faculty mentor</td>
</tr>
<tr>
<td>3-5</td>
<td>Student and mentor review and discuss outline and draft of paper</td>
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</tr>
<tr>
<td>16</td>
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</tbody>
</table>

**Attendance**

The resources of Purdue University are provided for the intellectual development of its students. Courses with defined schedules are provided to facilitate an orderly and predictable environment for learning, as well as to provide assurance of a registered student's right to access the course. Scheduled courses allow students to avoid conflicts and reflect the University's expectation that students should be present for every meeting of a class/laboratory for which they are registered. Faculty are responsible for organizing and delivering a course of instruction and for certifying student accomplishment on the basis of performance.

Students are expected to attend every scheduled class. If you have a valid excuse for missing class, including illness, family emergency, religious observation, military requirement, University-sponsored activity, or any other absence recognized by Purdue, one of the instructors will provide you the information missed. Students missing class without a valid excuse will not receive assistance from the instructors in obtaining missed material.

For additional information, consult the official Purdue policy on class attendance:

[http://www.purdue.edu/studentregulations/regulations_procedures/classes.html](http://www.purdue.edu/studentregulations/regulations_procedures/classes.html)

**Course evaluation**

During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor(s). On Monday of the fifteenth week of classes, you will receive an official email from evaluation administrators with a link to the online evaluation site. You will have two weeks to complete this evaluation. Your participation in this evaluation is an integral part of this course. Your feedback is vital to improving education at Purdue University. We strongly urge you to participate in the evaluation system.
Academic Integrity
From Stephen Akers, Executive Associate Dean of Students (https://www.purdue.edu/odos/academic-integrity/):
Purdue University values intellectual integrity and the highest standards of academic conduct. To be prepared to
meet societal needs as leaders and role models, students must be educated in an ethical learning environment that
promotes a high standard of honor in scholastic work. Academic dishonesty undermines institutional integrity
and threatens the academic fabric of Purdue University. Dishonesty is not an acceptable avenue to success. It
diminishes the quality of a Purdue education, which is valued because of Purdue's high academic standards.

Fostering an appreciation for academic standards and values is a shared responsibility among students, faculty,
and staff. The information in this brochure is directed to students to define academic dishonesty and how to avoid
it.

Definition of academic dishonesty
Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly
furnishing false information to the University are examples of dishonesty" (Part 5, Section III-B-2-a, Student
Regulations). Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying,
and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal
cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly
to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest" (University

More specifically, the following are a few examples of academic dishonesty that have been discovered at Purdue
University.
- substituting on an exam for another student
- substituting in a course for another student
- paying someone else to write a paper and submitting it as one's own work
- giving or receiving answers by use of signals during an exam
- copying with or without the other person's knowledge during an exam
- doing class assignments for someone else
- plagiarizing published material, class assignments or lab reports
- turning in a paper that has been purchased from a commercial research firm or obtained from the Internet
- padding items of a bibliography
- obtaining an unauthorized copy of a test in advance of its scheduled administration
- using unauthorized notes during an exam
- collaborating with other students on assignments when it is not allowed
- obtaining a test from the exam site, completing and submitting it later
- altering answers on a scored test and submitting it for a regrade
- accessing and altering grade records
- stealing class assignments from other students and submitting them as one's own
- fabricating data
- destroying or stealing the work of other students

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words
and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:
- using the exact language of someone else without the use of quotation marks and without giving proper
credit to the author
- presenting the sequence of ideas or arranging the material of someone else even though such is expressed in
one's own words, without giving appropriate acknowledgment submitting a document written by someone
else but representing it as one's own

Nondiscrimination policy statement
Purdue University is committed to maintaining a community which recognizes and values the inherent worth and
dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and
courages each individual to strive to reach his or her own potential. In pursuit of its goal of academic
excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its
many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches
campus life.
Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Purdue’s Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its affirmative action program.

Any question of interpretation regarding this Nondiscrimination Policy Statement shall be referred to the Vice President for Ethics and Compliance for final determination.

For additional information: http://www.purdue.edu/purdue/ea_eou_statement.html

Students with disabilities
Academic accommodations must be arranged through the Disability Resource Center (http://www.purdue.edu/studentsuccess/specialized/drc/). The instructors are 100% committed to make sure all necessary accommodations are met to ensure all students have the opportunity to learn. If there is any additional support that we may offer, please do not hesitate to contact us.

Purdue University is committed to making education, employment, services, programs and activities accessible. Purdue University offers numerous resources to employees, students and visitors who may need additional assistance while attending, visiting and/or working for the University. The Purdue Community works together to remove any barriers that prevent equal opportunities to individuals who have disabilities.

Campus emergency and adverse weather procedures
Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus.

• For any emergency call 911.
• There are nearly 300 Emergency Telephone Systems throughout campus that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected to the PUPD.
• If we hear a fire alarm we will immediately evacuate the building by directly exiting outside through the door at the front right of the room.
• If we are notified of a Shelter in Place requirement for a tornado warning we will shelter in the lowest level of this building away from windows and doors. Our preferred location is the basement. We will proceed out of the lecture room entrance (the door you come in) and take the stairs into the basement. Once in the basement, proceed to the end of the hallway to accommodate other people coming down the stairs.
• If we are notified of a Shelter in Place requirement for a hazardous materials release we will shelter in our classroom shutting any open doors and windows.
• If we are notified of a Shelter in Place requirement for a civil disturbance such as a shooting we will shelter in a room that is securable preferably without windows. Our preferred location is in the lecture hall.


When harsh weather is a possibility, Purdue administrators continuously monitor forecasts to ensure public safety. The university uses several systems to alert the campus community about weather-related changes to class schedules or work hours, starting with the Purdue home page. For more information on weather preparedness: http://www.purdue.edu/newsroom/health_safety/weather.html
Supporting Documentation

Semester(s) Offered: Fall
Schedule Type (e.g. Lecture/Lab) and Hours: Lecture (LEC) - 2
Credit(s): 2
Course Title: LA 10110: Survey of Landscape Architecture

A. Justification for the course:
   Reduction in hours reflects the re-assignment of appropriate content from the LA 10100 course to the newly-created (spring 2016) LA 16100 course.

B. Outcomes:
   Will the course be nominated for inclusion on a University Foundational Core or COA Core course List: No.

College Learning Outcomes Addressed by this Course:

   x Professional Preparation: Demonstrate proficiency in their chosen discipline that incorporates knowledge skills, technology, and professional conduct.
   x Social Science Principles: Demonstrate ability to apply social, economic, political, and environmental principles to living in a global community.
   x Civic Responsibility: Demonstrate awareness of civic responsibility to community and society at large.

Specific Learning Outcomes:
At the conclusion of the course the student shall be able to:
- Define Landscape architecture and the scope of projects and design services offered by LAs.
- Apply an understanding of natural, social, and behavioral sciences in making judgments about landscape spaces.
- Describe different types of landscape architectural practices, and a representative range of professional landscape architectural projects.
- Communicate using the vocabulary of landscape architectural design processes, materials and construction practices, and professional practice.

Methods of evaluation or assessment:

<table>
<thead>
<tr>
<th>Methods of assessment</th>
<th>Check all that apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. exams and quizzes</td>
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<tr>
<td>2. assessment and scoring of in class participation</td>
<td>☐</td>
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<tr>
<td>3. assignments</td>
<td>☒</td>
</tr>
<tr>
<td>4. class presentations</td>
<td>☐</td>
</tr>
<tr>
<td>5. Other (specify):</td>
<td></td>
</tr>
</tbody>
</table>
Example of Syllabus

LA 10110 Survey of Landscape Architecture

Instructor: Sean Rotar, PLA, ASLA, Associate Professor
Office: 311 HORT
Office Phone: 765 / 49-46007
E-mail: srotar@purdue.edu
Office Hours: MW 10:30 am-12:00 noon; H 9:30 am-11:00 am; By appt.

COURSE DESCRIPTION
An overview of landscape architecture, this course provides students with their first introduction to the knowledge areas, skills, and abilities that form the foundation of the landscape architecture profession. The course offers a preview of the discipline for pre-landscape architecture and horticulture students while also providing general information for students across campus who have an interest in becoming familiar with landscape architecture.

GENERAL COURSE GOALS
The material presented in LA 101 will comprise a broad overview of the profession of landscape architecture. The course has three primary goals:

1. To provide students in a career in landscape architecture with an appropriate knowledge base with which to make an informed career choice.
2. To introduce the profession of landscape architecture to students outside of the profession who might apply its social and environmental principles of design to other fields, or who may be future consumers of landscape architecture services.
3. To provide students a framework for thinking about landscapes and landscape design.

LEARNING OBJECTIVES
At the conclusion of the course the student shall be able to:

1. Define Landscape architecture and the scope of projects and design services offered by LAs.
2. Apply an understanding of natural, social, and behavioral sciences in making judgments about landscape spaces.
3. Describe different types of landscape architectural practices, and a representative range of professional landscape architectural projects.
4. Communicate using the vocabulary of landscape architectural design processes, materials and construction practices, and professional practice.

COURSE RATIONALE
Landscape Architecture encompasses the broad spectrum of environmental and site design including natural resources planning, housing, parks (urban, county, state, and national), campuses, and commercial and institutional sites. The profession is practiced at scales ranging from small residential gardens to regional land use plans.

LA 101 is part of a sequence and is a foundation for any future courses in Landscape Architecture. Therefore the design principles & methods you are shaping now will form the foundation of the critical skills you will come to derive from such courses, and in turn to your own landscape design philosophy.
The course format consists of a series of topical lectures, presentations, discussions, exercises, and field experiences which provide an overview of the scope and practice of landscape architecture.

Course topics include:
- Defining Landscape Architecture
- Nature, Culture, and Design
- Urban design (plazas, streetscapes)
- Site Design Process
- Professional Practice
- Current Practices
- Theoretical Foundations
- Landscape Materials and Construction

All students are expected to demonstrate understanding and application of skills taught in the course. It is the student’s responsibility to practice and develop these skills and meet the requirements of the course.

There is no assigned text for the course. Rather, the course relies on an extensive program of in-class learning. Therefore, class attendance and notetaking is extremely important.

Grades will be derived from the following types of class activities: daily assignments, tests, take-home projects, and short reports. The final grade will be determined by a weighted average of assigned class work. Tests will account for approx. 55% of the grade (3 exams, at 25 points each); take-home and in-class exercises and activities, approx. 45%.

Dates for tests are announced on the attached course schedule. There will be a final exam (test #3) in the course, scheduled during Exam Week. Specific exam date and time will be announced.

Outdoor exercises are planned for the class. Field trips will be announced in advance. It is important that you be present on time and dress for the appropriate weather. All sites to be visited will be on or near campus.

Assignments must be turned in on time to assure full credit. Late work will be accepted at the discretion of the instructor and may be penalized as much as one grade letter per day. Missed work may be made up at the discretion of the instructor; however, some course work, especially that taking place during the class session, cannot be made up.

The instructor reserves the right to change the syllabus at any time due to our depth of discussions, university scheduling, guest speaker schedules, or weather. In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Information concerning changes in the course will be available by phone or email as indicated above.
GRADING
Grading in this course will employ the “plus-minus” system as follows:
Grade Range GPA Value
A+ 97.0 – 100 4.0
A 93.0 - 96.9 4.0
A- 90.0 - 92.9 3.7
B+ 87.0 - 89.9 3.3
B 83.0 - 86.9 3.0
B- 80.0 - 82.9 2.7
C+ 77.0 - 79.9 2.3
C 73.0 - 76.9 2.0
C- 70.0 - 72.9 1.7
D+ 67.0 - 69.9 1.3
D 63.0 - 66.9 1.0
D- 60.0 - 62.9 0.7 (lowest passing grade)
F <60.0 0.0

SAMPLE COURSE SCHEDULE

COURSE SCHEDULE
LA 10110 SURVEY OF LANDSCAPE ARCHITECTURE    FALL SEMESTER 20XX

WEEK 1  Introduction; the Profession  W  Introduction - What is design?
F  The Profession and Professionals

WEEK 2  Nature as a Foundation  F  Nature as Art and Philosophy
W  Nature as a client and teacher

EX. 1 ISSUED

WEEK 3  Nature as Foundation  F  Sketching exercise
W  I Love to do Sketches - Halprin

WEEK 4  Therapy of Nature  W  A Park for New York
F  Design for sociability- William Whyte  EX. 1 DUE

WEEK 5  People as a Foundation  F  Behavior settings; needs vs. wants
W  Maslow’s Pyramid; Prospect/Refuge

WEEK 6  People as Foundation  F  Lynch and the Lynchian Elements
W  EXAM 1

WEEK 7  People as Foundation  F  Mobility Exercise
W  Design for all populations
WEEK 8 Space
  W Space and Enclosure
  F Quantity and Quality of Space EX. 2 ISSUED

WEEK 9 Space
  W Defining space in point, line, and plane F New Spatial Definitions- the Moderns

EX. 2 DUE

LA 10110. SURVEY OF LANDSCAPE ARCHITECTURE con’t.

WEEK 10 Design Process
  W Introduction; clients;
  F Diagrams in the design process Analysis and Concepts

WEEK 11 Design Process
  W Concepts and Design Development
  F DD-A Sketch Exercise

WEEK 12 Design Process
  W Communicating in Plan/ Section/ Elevation EX. 3 ISSUED
  F EXAM 2

WEEK 13 Materials
  W Landfor
  F Plants

EX. 3 DUE
EX. 4 ISSUED

WEEK 14 THANKSGIVING- no class
OFFICE HOURS
The office location and telephone number of the instructor is listed above. While the office hour period allows ample opportunity for interaction, the instructor will be delighted to accommodate student requests for meetings at mutually convenient times.

EMAIL POLICY
Students may email the instructor with questions, concerns, etc. if they desire. However, face-to-face interaction in class, immediately after class, or during office hours and/or communication by telephone will result in a richer experience for the student and a happier student/professor interaction.

PARTICIPATION POLICY
Students are expected to arrive on time for class and to remain until the scheduled class time is over. Any students needing to be excused from class early must discuss with the instructor before the class begins. While in attendance, students are expected to be attentive and to participate in all course activity and discussion.

ELECTRONICS POLICY
This course emphasizes personal interaction, hand note-taking and hand sketching. As a result, cell phones and computers are to be turned off during class. In general, no uses requiring personal electronics (telephone, telegraph, textagraph, “twitter” “Facebook”, instant-gram, etc.) are permitted.

ACADEMIC DISHONESTY
Purdue prohibits “dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty.” [Part 5, Section III-B-2-a, University Regulations] Furthermore, the University Senate has stipulated that “the commitment of acts of cheating, lying, and deceive in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest.” [University Senate Document 72-18, December 15, 1972]

Please refer to Purdue's student guide for academic integrity:
(http://www.purdue.edu/odos/aboutodos/academicintegrity.php)

ATTENDANCE
Attendance to lectures and work in class is critical to interaction with the instructor and the demonstration of skill development. Material covered in lectures and class discussion is the responsibility of the student. Some elements of this course will consist of in-class exercises for which there may be no make-up opportunity.
Students are expected to be present for every meeting of the classes in which they are enrolled. Only the instructor can excuse a student from a course requirement or responsibility. When conflicts or absences can be anticipated, such as for many University sponsored activities and religious observations, the student should inform the instructor of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to an instructor is not possible, the student should contact the instructor as soon as possible by email, or by contacting the main office that offers the course. When the student is unable to make direct contact with the instructor and is unable to leave word with the instructor’s department because of circumstances beyond the student’s control, and in cases of bereavement, the student or the student’s representative should contact the Office of the Dean of Students.

The link to the complete policy and implications can be found at http://www.purdue.edu/odos/services/classabsence.php

BEREAVEMENT STATEMENT
Purdue University recognizes that a time of bereavement is very difficult for a student. The University therefore provides the following rights to students facing the loss of a family member through the Grief Absence Policy for Students (GAPS). GAPS Policy: Students will be excused for funeral leave and given the opportunity to earn equivalent credit and to demonstrate evidence of meeting the learning outcomes for missed assignments or assessments in the event of the death of a member of the student’s family.

VIOLENT BEHAVIOR
Purdue University is committed to providing a safe and secure campus environment for members of the university community. Purdue strives to create an educational environment for students and a work environment for employees that promote educational and career goals. Violent Behavior impedes such goals. Therefore, Violent Behavior is prohibited in or on any University Facility or while participating in any university activity.

STUDENTS WITH DISABILITIES
Purdue University is required to respond to the needs of the students with disabilities as outlined in both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 through the provision of auxiliary aids and services that allow a student with a disability to fully access and participate in the programs, services, and activities at Purdue University.

If you have a disability that requires special academic accommodation, please make an appointment to speak with me as soon as possible in the semester in order to discuss any adjustments. It is the student's responsibility to notify the Disability Resource Center (http://www.purdue.edu/drc) of an impairment/condition that may require accommodations and/or classroom modifications.

EMERGENCIES
In the event of a personal emergency, please let the instructor know as soon as possible; likewise, should an emergency arise, the instructor will inform you through email about course modifications that may be necessary.

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor’s control. Relevant changes to this course will be announced through email. You are expected to read your @purdue.edu email on a frequent basis.

NONDISCRIMINATION
Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.
Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Executive Memorandum No. D-1, which provides specific contractual rights and remedies.
Supporting Documentation

Semester(s) Offered: Spring, offered even-numbered years

Schedule Type (e.g. Lecture/Lab) and Hours: Lecture (LEC) - 3

Credits: 3

Course Title: HORT 52500: The Plant Microbiome

A. Justification for the course:
This new graduate level course will provide students with an overview of factors regulating relationships between plants and their microbiome. Recent advances in omics-based technologies have revealed that the number of microbial cells inhabiting plants actually outnumbers plant cells, and this community of microorganisms is now often referred to as the 2nd genome of the plant, or its microbiome. Microorganisms living on or within plants are well known for their capacity to cause plant diseases, and recently it has become clear that human pathogens can use plants as an alternative host, allowing them to recolonize animal hosts once produce is ingested. However, while the activities of many of these microorganisms remain unclear, the vast majority of plant-associated microorganisms appear to benefit plants by helping them acquire nutrients and withstand biotic and abiotic stress. In this course, students will learn about the latest methods to collect and analyze root and shoot exudates, quantify the composition and activity of microbes associating with plants, and determine how these associations influence plant health and productivity. Critical reviews of the primary literature and development of a research proposal will help students acquire the skills needed to conduct research on this rapidly emerging topic.

B. Learning Outcomes and Methods of Assessment

i. Applicable to University Core Curriculum
This course ☐ will ☒ will not be nominated for inclusion on University Foundational Core. If no, skip to section ii.

<table>
<thead>
<tr>
<th>Foundational Learning Outcomes</th>
<th>Check all that apply</th>
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<tbody>
<tr>
<td>1. Written Communication</td>
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<td>2. Information Literacy</td>
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<td>3. Oral Communication</td>
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<td>4. Science</td>
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<td>5. Science, Technology and Society</td>
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<td>6. Mathematics/Quantitative Reasoning</td>
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<td>7. Human Cultures: Humanities</td>
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<td>8. Human Cultures: Behavioral &amp; Social Sciences</td>
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ii. Applicable to College of Agriculture Core
This course ☐ will ☒ will not be nominated for inclusion on College of Agriculture Core. If no, skip to section iii.

<table>
<thead>
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<tbody>
<tr>
<td>1. Mathematics and Sciences</td>
<td>□</td>
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<td>2. Written and Oral Communication</td>
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</table>
iii. Graduate Learning Outcomes (for 50000 and 60000 level courses only)

<table>
<thead>
<tr>
<th>Graduate Learning Outcomes</th>
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<tbody>
<tr>
<td>1. Advance Knowledge and Scholarship</td>
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<tr>
<td>2. Demonstrate Critical Thinking and Problem Solving</td>
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<td>3. Exhibit Ethical Conduct</td>
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<td>4. Communicate Effectively</td>
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<tr>
<td>5. Develop Professionalism</td>
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</table>

iv. Describe course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.)

Specific Learning Outcomes
- Describe basic processes regulating plant-microbial interactions in the rhizosphere and phyllosphere, and the implications of these interactions on plant and environmental health
- Critically evaluate and discuss primary literature in the field
- Compare and contrast methods used to study processes mediating plant-microbial relationships
- Identify questions that remain unanswered in the field and develop a research proposal to address one of these questions

v. Methods of evaluation or assessment:

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1. exams and quizzes</td>
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<td>2. assessment and scoring of in class participation</td>
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<td>3. assignments</td>
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<td>4. class presentations</td>
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<td>5. Other (specify): Click here to enter text.</td>
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C. Prerequisites
None.

D. Course Instructor and Contact Information
Dr. Lori Hoagland
Assistant Professor, Horticulture
Office: 314 Hort
Office hours: M, W, F 10:30-11:20
Tel: 765-494-1426
Email: lhoaglan@purdue.edu

E. Course Outline of Topics

Week 1
- Introduction to the plant microbiome and plant-microbial interactions
- The soil habitat

- Soil biology and soil food webs


**Week 2**

- Tools for studying microbial composition and activity in the rhizosphere and phyllosphere


- Discussion of plant-microbial interactions techniques paper

**Assigned reading:** TBD

**Hand in top three topic preferences for discussion papers**

**Week 3**

- Root architecture


- Root anatomy and development

**Assigned reading:** Zhu et al., 2011. From lab to field, new approaches to phenotyping root system architecture. *Current Opinions in Plant Biology* 14:310-317.

- Root-environment interactions

**Assigned reading:** TBD

**Week 4**

- Plant-soil feedbacks


- Plant driven selection of rhizosphere microbes


- Student led paper discussion

**Week 5**

- Microbial Biofilms and Quorum Sensing

**Assigned reading:** Danhorn and Fuqua, 2007. Biofilm formation by plant associated bacteria. *Annual Reviews Microbiology* 61:401-422.

- Metabolomics


- Student led paper discussion

**Week 6**

- Introduction to plant mutualisms


- The cryptic world of plant endophytes


- Student led paper discussion

**Week 7**

- Arbuscular mycorrhiza


- Nitrogen-fixation


- Student led paper discussion

**Week 8**

- Introduction to proteomics

**Assigned reading:** TBD
• Proteomic applications for plant-microbial interactions
  
  **Assigned reading:** TBD

• Student led paper discussion

**Week 9**

• Cheating in mutualisms
  

• Evolution of mutualisms in response to soil age
  

• Student led paper discussion

**Week 10**

• Terrestrial carbon and nutrient cycles
  
  **Assigned reading:** TBD

• Salinity and drought
  
  **Assigned reading:** TBD

• Student led paper discussion

**Week 11**

• Phytoremediation
  

• Disease suppressive soil
  
  **Assigned readings:** Lugtenberg et al., 2013. Microbial control of plant root diseases. AND Kamilova and de Bruyne, 2013. Plant growth promoting microorganisms: the road from an academically promising result to a commercial product. *In: Molecular Microbial. Ecology of the Rhizosphere*. De Bruijn (Ed). Wiley

• Student led paper discussion

**Week 12**

• Induced systemic resistance
  
  **Assigned readings:** Pieterse et al., 2014. Induced systemic resistance by beneficial microbes. *Annual Reviews Phytopathology* 52:347-375.

• Endophytes and herbivory in grasses
  
  **Assigned readings:** TBD

• Student led paper discussion

**Week 13**

• Considering possible linkages between soil and human health
  

• Factors mediating human pathogens in produce
  
  **Assigned reading:** TBD

**Week 14**

• Land-use impacts on rhizosphere microbial interactions
  

• Breeding for beneficial plant-microbial relationships: how do we get there?
  
  **Assigned reading:** Zancarini et al., 2013. Combining molecular microbial ecology with ecophysiology and plant genetics for a better understanding of plant-microbial communities’ interactions in the rhizosphere. *In: Molecular Microbial Ecology of the Rhizosphere*. De Bruijn (Ed). Wiley.

**F. Reading List (include course text)**

**Assigned readings:** Readings will consist of journal review articles and chapters from the texts below.

Readings will be available on blackboard prior to the associated lecture. Each student will choose one research-based article from the primary literature to formally review and discuss in class.


Assigned readings: Lugtenberg et al., 2013. Microbial control of plant root diseases.


**Assigned reading:** Zancarini et al., 2013. Combining molecular microbial ecology with ecophysiology and plant genetics for a better understanding of plant-microbial communities’ interactions in the rhizosphere. In: Molecular Microbial Ecology of the Rhizosphere. De Bruijn (Ed). Wiley.

**G. Library Resources**

Click here to enter text.

**H. Example of Course Syllabus**

**The Plant Microbiome 52500**

Spring 2018

**Instructor:**
Dr. Lori Hoagland
Assistant Professor, Horticulture
Office: 314 Hort
Office hours: M, W, F 10:30-11:20
Tel: 765-494-1426
Email: lhoaglan@purdue.edu

**Class location and hours:** Hort 210; Monday, Wednesday, and Friday 9:30-10:20

**Course description:** This course will provide an overview of the complexity and importance of the plant microbiome. Students taking this course will gain in-depth knowledge of plant-microbial relationships and how they interact to influence plant fitness and environmental health in natural and managed ecosystems. We will cover the latest methods to collect and analyze root and shoot exudates, quantify the composition and activity of microbes associating with plants, and determine how these associations influence plant health and productivity. Critical reviews of recent projects investigating the evolution and maintenance of plant-microbial relationships and how they can be manipulated to improve plant health and productivity, will help students develop the skills needed to conduct research on this important topic.

**Learning objectives:**
- Describe basic processes regulating plant-microbial interactions in the rhizosphere and phyllosphere, and the implications of these interactions on plant and environmental health
- Critically evaluate and discuss primary literature in the field
- Compare and contrast methods used to study processes mediating plant-microbial relationships
- Identify questions that remain unanswered in the field and develop a research proposal to address one of these questions

**Course format:** Discussion of basic concepts and current topics related to the plant microbiome; critical review and presentation of primary literature; and, development and presentation of a research proposal.

**Expectations:** Students are expected to attend and actively participate in all discussions and journal article reviews, and be respectful of others’ opinions during class discussions.

**Assigned readings:** Readings will consist of journal review articles and chapters from the texts below. Readings will be available on blackboard prior to the associated lecture. Each student will chose one research-based article from the primary literature to formally review and discuss in class.
Grading:

- **15% Participation during lectures** (Students should read assigned material prior to class and have written notes/bullet points to help facilitate discussion. This could include key topics/points, questions about content/terms, observations and/or opinions of the content/approach, future directions for the topic)

- **10% Written review of one primary literature article** (Must include at least one paragraph covering each of the following points: goal of the work, approach, experimental observations, conclusions – including whether they are supported by the evidence and quality of the evidence, and general strengths and weaknesses of the paper)

- **10% Leading discussion of one primary research article** (Must include discussion of each of the points covered in the written review)

- **15% Participation during primary literature reviews** (All students must read each of the research papers assigned by your peers prior to class, and come prepared with written points/questions covering each of the topics to help facilitate discussion)

- **20% Take-home exam** (handed out Apr. 29 and due May 6th)

- **20% Research proposal** (Must include background/need for the research, hypothesis, materials and methods, citations)

- **10% Presentation of your proposal to the class** (Appearance and clear articulation of rational for the project and experimental approach proposed)

Resources for critically reviewing the primary literature:

- How to read and review a scientific journal article: writing summaries and critiques. Duke University Writing Studio. [http://twp.duke.edu/writing-studio](http://twp.duke.edu/writing-studio)

- How to read a scientific paper. Little and Parker – U. of Arizona. [http://www.biochem.arizona.edu/classes/bioc568/papers.htm](http://www.biochem.arizona.edu/classes/bioc568/papers.htm)

Course schedule:

**Week 1**

11-Jan: Introduction to the plant microbiome and plant-microbial interactions

13-Jan: The soil habitat


15-Jan: Soil biology and soil food webs


**Week 2**

18-Jan: MLK Day – no class
20-Jan: Tools for studying microbial composition and activity in the rhizosphere and phyllosphere


22-Jan: Discussion of plant-microbial interactions techniques paper

**Assigned reading:** TBD

**Hand in top three topic preferences for discussion papers**

**Week 3**

25-Jan: Root architecture


27-Jan: Root anatomy and development

**Assigned reading:** Zhu et al., 2011. From lab to field, new approaches to phenotyping root system architecture. *Current Opinions in Plant Biology* 14:310-317.

29-Jan: Root-environment interactions

**Assigned reading:** TBD

**Week 4**

1-Feb: Plant-soil feedbacks


3-Feb: Plant driven selection of rhizosphere microbes


5-Feb: Student led paper discussion

**Week 5**

8-Feb: Microbial Biofilms and Quorum Sensing

**Assigned reading:** Danhorn and Fuqua, 2007. Biofilm formation by plant associated bacteria. *Annual Reviews Microbiology* 61:401-422.

10-Feb: Metabolomics


12-Feb: Student led paper discussion

**Week 6**

15-Feb: Introduction to plant mutualisms

**Assigned reading:** Lagunas et al., 2015. Housing helpful invaders: the evolutionary and molecular architecture underlying plant root-mutualist microbe interactions. *J. of Experimental Botany* doi:10.1093/jxb/erv038

17-Feb: The cryptic world of plant endophytes


19-Feb: Student led paper discussion
**Week 7**
22-Feb: Arbuscular mycorrhiza  

24-Feb: Nitrogen-fixation  

26-Feb: Student led paper discussion  
*Deadline for talking to Dr. Hoagland about research proposal idea*

**Week 8**
29-Feb: Introduction to proteomics  
*Assigned reading:* TBD

2-Mar: Proteomic applications for plant-microbial interactions  
*Assigned reading:* TBD

4-Mar: Student led paper discussion

**Week 9**
7-Mar: Cheating in mutualisms  

9-Mar: Evolution of mutualisms in response to soil age  

11-Mar: Student led paper discussion

**Spring break (3/14-3/18)**

**Week 10**
21-Mar: Terrestrial carbon and nutrient cycles  
*Assigned reading:* TBD

23-Mar: Salinity and drought  
*Assigned reading:* TBD

25-Mar: Student led paper discussion

**Week 11**
28-Mar: Phytoremediation  

30-Mar: Disease suppressive soil  
*Assigned readings:* Lugtenberg et al., 2013. Microbial control of plant root diseases.  
*AND* Kamilova and de Bruyne, 2013. Plant growth promoting microorganisms: the road from an academically promising result to a commercial product. *In: Molecular Microbial Ecology of the Rhizosphere*. De Bruijn (Ed). Wiley
1-Apr: Student led paper discussion

**Week 12**
4-Apr: Induced systemic resistance

6-Apr: Endophytes and herbivory in grasses
*Assigned readings:* TBD

27-Mar: Student led paper discussion

**Week 13**
11-Apr: Considering possible linkages between soil and human health

13-Apr: Factors mediating human pathogens in produce
*Assigned reading:* TBD

15-Apr: Student led paper discussion

**Week 14**
18-Apr: Land-use impacts on rhizosphere microbial interactions

20-Apr: Breeding for beneficial plant-microbial relationships: how do we get there?
*Assigned reading:* Zancarini et al., 2013. Combining molecular microbial ecology with ecophysiology and plant genetics for a better understanding of plant-microbial communities’ interactions in the rhizosphere. *In: Molecular Microbial Ecology of the Rhizosphere.* De Bruijn (Ed). Wiley

22-Apr: Student led paper discussions

**Week 15**
25-Apr: Presentations of research proposals
27-Apr: Presentations of research proposals
29-Apr: Presentations of research proposals

*Take-home exam handed out*

**Week 16:**
6-May: *Take home final exam due*

**Attendance**
The resources of Purdue University are provided for the intellectual development of its students. Courses with defined schedules are provided to facilitate an orderly and predictable environment for learning, as well as to provide assurance of a registered student's right to access the course. Scheduled courses allow students to avoid conflicts and reflect the University’s expectation that students should be present for every meeting of a class/laboratory for which they are registered. Faculty are responsible for organizing and delivering a course of instruction and for certifying student accomplishment on the basis of performance.

Students are expected to attend every scheduled class. If you have a valid excuse for missing class, including illness, family emergency, religious observation, military requirement, University-sponsored activity, or any
other absence recognized by Purdue, one of the instructors will provide you the information missed. Students missing class without a valid excuse will not receive assistance from the instructors in obtaining missed material. For additional information, consult the official Purdue policy on class attendance: http://www.purdue.edu/studentregulations/regulations_procedures/classes.html

Course evaluation
During the last two weeks of the semester, you will be provided an opportunity to evaluate this course and your instructor(s). On Monday of the fifteenth week of classes, you will receive an official email from evaluation administrators with a link to the online evaluation site. You will have two weeks to complete this evaluation. Your participation in this evaluation is an integral part of this course. Your feedback is vital to improving education at Purdue University. We strongly urge you to participate in the evaluation system.

Academic Integrity
From Stephen Akers, Executive Associate Dean of Students (https://www.purdue.edu/odos/academic-integrity/):

Purdue University values intellectual integrity and the highest standards of academic conduct. To be prepared to meet societal needs as leaders and role models, students must be educated in an ethical learning environment that promotes a high standard of honor in scholastic work. Academic dishonesty undermines institutional integrity and threatens the academic fabric of Purdue University. Dishonesty is not an acceptable avenue to success. It diminishes the quality of a Purdue education, which is valued because of Purdue's high academic standards.

Fostering an appreciation for academic standards and values is a shared responsibility among students, faculty, and staff. The information in this brochure is directed to students to define academic dishonesty and how to avoid it.

Definition of academic dishonesty
Purdue prohibits "dishonesty in connection with any University activity. Cheating, plagiarism, or knowingly furnishing false information to the University are examples of dishonesty" (Part 5, Section III-B-2-a, Student Regulations). Furthermore, the University Senate has stipulated that "the commitment of acts of cheating, lying, and deceit in any of their diverse forms (such as the use of substitutes for taking examinations, the use of illegal cribs, plagiarism, and copying during examinations) is dishonest and must not be tolerated. Moreover, knowingly to aid and abet, directly or indirectly, other parties in committing dishonest acts is in itself dishonest" (University Senate Document 72-18, December 15, 1972).

More specifically, the following are a few examples of academic dishonesty that have been discovered at Purdue University.
- substituting on an exam for another student
- substituting in a course for another student
- paying someone else to write a paper and submitting it as one's own work
- giving or receiving answers by use of signals during an exam
- copying with or without the other person's knowledge during an exam
- doing class assignments for someone else
- plagiarizing published material, class assignments or lab reports
- turning in a paper that has been purchased from a commercial research firm or obtained from the Internet
- padding items of a bibliography
- obtaining an unauthorized copy of a test in advance of its scheduled administration
- using unauthorized notes during an exam
- collaborating with other students on assignments when it is not allowed
- obtaining a test from the exam site, completing and submitting it later
- altering answers on a scored test and submitting it for a regrade
- accessing and altering grade records
- stealing class assignments from other students and submitting them as one's own
- fabricating data
• destroying or stealing the work of other students

Plagiarism is a special kind of academic dishonesty in which one person steals another person's ideas or words and falsely presents them as the plagiarist's own product. This is most likely to occur in the following ways:

• using the exact language of someone else without the use of quotation marks and without giving proper credit to the author

• presenting the sequence of ideas or arranging the material of someone else even though such is expressed in one's own words, without giving appropriate acknowledgment submitting a document written by someone else but representing it as one's own

Nondiscrimination policy statement

Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life.

Purdue University views, evaluates, and treats all persons in any University related activity or circumstance in which they may be involved, solely as individuals on the basis of their own personal abilities, qualifications, and other relevant characteristics.

Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, genetic information, marital status, parental status, sexual orientation, gender identity and expression, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in Purdue’s Equal Opportunity, Equal Access and Affirmative Action policy which provides specific contractual rights and remedies. Additionally, the University promotes the full realization of equal employment opportunity for women, minorities, persons with disabilities and veterans through its affirmative action program.

Any question of interpretation regarding this Nondiscrimination Policy Statement shall be referred to the Vice President for Ethics and Compliance for final determination.

For additional information: http://www.purdue.edu/purdue/ea_eou_statement.html

Students with disabilities

Academic accommodations must be arranged through the Disability Resource Center (http://www.purdue.edu/studentsuccess/specialized/drc/). The instructors are 100% committed to make sure all necessary accommodations are met to ensure all students have the opportunity to learn. If there is any additional support that we may offer, please do not hesitate to contact us.

Purdue University is committed to making education, employment, services, programs and activities accessible. Purdue University offers numerous resources to employees, students and visitors who may need additional assistance while attending, visiting and/or working for the University. The Purdue Community works together to remove any barriers that prevent equal opportunities to individuals who have disabilities.

Campus emergency and adverse weather procedures

Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus.

• For any emergency call 911.

• There are nearly 300 Emergency Telephone Systems throughout campus that connect directly to the Purdue Police Department (PUPD). If you feel threatened or need help, push the button and you will be connected to the PUPD.

• If we hear a fire alarm we will immediately evacuate the building by directly exiting outside through the door at the front right of the room.

• If we are notified of a Shelter in Place requirement for a tornado warning we will shelter in the lowest level
of this building away from windows and doors. Our preferred location is the basement. We will proceed out of the lecture room entrance (the door you come in) and take the stairs into the basement. Once in the basement, proceed to the end of the hallway to accommodate other people coming down the stairs.

- If we are notified of a Shelter in Place requirement for a hazardous materials release we will shelter in our classroom shutting any open doors and windows.
- If we are notified of a Shelter in Place requirement for a civil disturbance such as a shooting we will shelter in a room that is securable preferably without windows. Our preferred location is in the lecture hall.

For additional information, please consult the Emergency Procedure Guidelines: http://www.purdue.edu/emergency_preparedness/. Sign up for emergency text alerts: http://www.purdue.edu/securepurdue/

When harsh weather is a possibility, Purdue administrators continuously monitor forecasts to ensure public safety. The university uses several systems to alert the campus community about weather-related changes to class schedules or work hours, starting with the Purdue home page. For more information on weather preparedness: http://www.purdue.edu/newsroom/health_safety/weather.html
Natural Resources and Environmental Science Program
Proposed Course and Curricular Changes

A. COURSE TO BE DELETED

NRES 29000 - Introduction to Environmental Science
Credit Hours: 3.00. Introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. For all students interested in an introductory natural resources or environmental science elective. Typically offered Fall Spring.

Rationale:
Course number will be changed to NRES 12500.

B. COURSES TO BE ADDED

NRES 12500 – Environmental Science and Conservation
Credit Hours: 3.00. (NRES 12500, EAPS 12500, AGRY 12500) Introduction to environmental science and conservation includes topics in ecological principles, conservation and natural resource management, human impacts on the environment, toxic waste disposal, climate change, energy, air and water pollution, environmental geology, and geologic hazards. Typically offered Fall Spring Summer.

C. COURSES TO BE CHANGED

None

D. CURRICULAR CHANGES

None
Supporting Documentation

Semesters Offered: Fall Spring Summer

Lecture/Lab Hours: Class 3

Credits: 3

Course Title: Environmental Science and Conservation

A. Justification:

The course is cross-listed as Introduction to Environmental Conservation (FNR 10300) and Introduction to Environmental Science (EAPS 11300/NRES 29000/AGRY 29000) in the course catalog. We have taught the course cross-listed across all four departments for three semesters. To make course registration simpler for the students and blackboard function easier and more efficient for the faculty, the instructors want to change the name and course number. The name should be changed to Environmental Science and Conservation and the course number should be FNR 12500/EAPS 12500/NRES 12500/AGRY 12500. This will make the enrollment process uniform across the departments. The course content will not change from how it has been taught for the past three semesters.

B. Outcomes:

FNR 10300 and EAPS 11300/NRES29000/AGRY29000 are listed as meeting the UCC Science, Technology and Society (STS) foundational outcome. We assume that the new course will continue to be listed as meeting this outcome since we are just making a minor change in the title and course number. The course is also listed as a science elective in the COA. We will apply to the UCC and CSRC to have the course continue to be listed in these categories under the new name and course number.

Outcomes:

At the end of this course, students will be able to:

1. describe the issues, facts, and concepts central to a broad range of environmental and conservation topics,
2. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
3. describe the work done in five scientific disciplines: ecology, environment, resource management, conservation biology, and environmental geology.

This course helps satisfy the following embedded outcomes:

1. Critical Thinking
2. Ethical Reasoning
3. Global Citizenship and Social Responsibility
4. Quantitative Reasoning
Methods of evaluation or assessment:

- Exams and quizzes
- Assessment and scoring of in class participation
- Assignments
- Class presentations
- Other (specify):
When you have questions about the course, send an email first to Megan and she will make sure your question gets to the correct instructor.

Text and Learning Tools:
Cunningham, W.P. & M.A. Cunningham. 2017. *Principles of Environmental Science*. McGraw-Hill. Eighth Edition. Available as either a print or E-BOOK; you get the e-book when you purchase Connect (with LearnSmart) through McGraw-Hill’s website. You will also need an i<clicker2 and LearnSmart, the online learning system for this course. Instructions on obtaining all of these are posted on Blackboard.

Course Overview/Description:
This course is offered to students interested in an introductory natural resource or environmental science elective. Topics include: an introduction to ecological principles, history of conservation, natural resource management, human impacts on the environment, and environmental ethics. We will discuss issues currently in the news such as climate change, energy policy, protection of endangered species, handling of hazardous waste, and pollution prevention and control.

Learning Outcomes:
At the end of this course, students will be able to:
4. describe the issues, facts, and concepts central to a broad range of environmental and conservation topics,
5. form their own opinions on controversial topics, explaining what they think we should do regarding topics in the news,
6. describe the work done in four scientific disciplines: ecology, environment, resource management, and conservation biology.

### Course Schedule

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<th>Date</th>
<th>Topic</th>
<th>Week</th>
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<tr>
<td>Aug. 22</td>
<td>Introduction (All Instructors)</td>
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<td>24</td>
<td>Science and the environment (Dunning/Lifton)</td>
<td>Week 1</td>
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<td>26</td>
<td>Politics and the environment (Dukes)</td>
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<tr>
<td>29</td>
<td>Economics and the environment (Dunning)</td>
<td></td>
<td></td>
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<tr>
<td>31</td>
<td>Human population growth (Graveel)</td>
<td>Week 2</td>
<td></td>
</tr>
<tr>
<td>Sept. 2</td>
<td>Basic Ecology (Dunning)</td>
<td></td>
<td>Ch. 3</td>
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<tr>
<td></td>
<td><strong>LABOR DAY – no class</strong></td>
<td></td>
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<tr>
<td>7</td>
<td>Forest and grassland systems (Dunning)</td>
<td>Week 3</td>
<td>Ch. 5, pt 1</td>
</tr>
<tr>
<td>9</td>
<td>Fire ecology (Dunning)</td>
<td></td>
<td>Ch. 6</td>
</tr>
<tr>
<td>12</td>
<td>National Parks and Wilderness (Dunning)</td>
<td></td>
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<tr>
<td>14</td>
<td>Biodiversity (Dunning)</td>
<td>Week 4</td>
<td>Ch. 5, pt 2</td>
</tr>
<tr>
<td>16</td>
<td>Extinction (Dunning)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Habitat loss and fragmentation (Dunning)</td>
<td></td>
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<tr>
<td>21</td>
<td>Genetic conservation (Dunning)</td>
<td>Week 5</td>
<td></td>
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<tr>
<td>23</td>
<td>Endangered species &amp; CITES (Dunning)</td>
<td></td>
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<tr>
<td>26</td>
<td><strong>EXAM 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Human population (j-curve) (Graveel)</td>
<td>Week 6</td>
<td>Ch. 4</td>
</tr>
<tr>
<td>30</td>
<td>Food resources agriculture, GMO’s (Graveel)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 3</td>
<td>Physical Properties of Soil (Graveel)</td>
<td></td>
<td>Ch. 7</td>
</tr>
<tr>
<td>5</td>
<td>Chemical Properties of Soil (Graveel)</td>
<td>Week 7</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Solid waste – landfills/recycling (Graveel)</td>
<td></td>
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<tr>
<td>10</td>
<td><strong>Fall Break</strong></td>
<td></td>
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<tr>
<td>12</td>
<td>Solid toxic and hazardous waste (Graveel)</td>
<td>Week 8</td>
<td>Ch. 14</td>
</tr>
<tr>
<td>14</td>
<td>Bioremediation (Graveel)</td>
<td></td>
<td></td>
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<tr>
<td>17</td>
<td>Toxicology (Graveel)</td>
<td></td>
<td>Ch. 8</td>
</tr>
<tr>
<td>19</td>
<td>Emerging Environ. Contaminants (Graveel)</td>
<td>Week 9</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td><strong>EXAM 2</strong></td>
<td></td>
<td></td>
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<tr>
<td>24</td>
<td>Air resources (Lifton)</td>
<td></td>
<td>Ch. 10</td>
</tr>
<tr>
<td>26</td>
<td>Air pollution (Lifton)</td>
<td>Week 10</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Water resources (Lifton)</td>
<td></td>
<td>Ch. 11</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Week</td>
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<tr>
<td>Nov. 31</td>
<td>Surface water pollution (Lifton)</td>
<td></td>
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<tr>
<td>Dec. 2</td>
<td>Ground water pollution (Lifton)</td>
<td>Week 11</td>
<td></td>
</tr>
<tr>
<td>Dec. 4</td>
<td>Geology basics (Lifton)</td>
<td>Ch. 12</td>
<td></td>
</tr>
<tr>
<td>Dec. 7</td>
<td>Geology hazards I (Lifton)</td>
<td></td>
<td></td>
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<tr>
<td>Dec. 9</td>
<td>Geology hazards II (Lifton)</td>
<td>Week 12</td>
<td></td>
</tr>
<tr>
<td>Dec. 11</td>
<td><strong>EXAM 3</strong></td>
<td></td>
<td></td>
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<tr>
<td>Dec. 14</td>
<td>Climate change mechanisms &amp; evidence (Dukes)</td>
<td>Ch. 9 Part 1</td>
<td></td>
</tr>
<tr>
<td>Dec. 16</td>
<td>Climate change drivers &amp; projections (Dukes)</td>
<td>Week 13</td>
<td>Ch. 9 Part 2</td>
</tr>
<tr>
<td>Dec. 18</td>
<td>Climate change impacts (Dukes)</td>
<td>Ch. 9 Part 3</td>
<td></td>
</tr>
<tr>
<td>Dec. 21</td>
<td>Climate change solutions (Dukes)</td>
<td></td>
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<tr>
<td>Dec. 23-25</td>
<td><strong>Thanksgiving Break</strong></td>
<td>Week 14</td>
<td></td>
</tr>
<tr>
<td>Dec. 28</td>
<td>Energy resources and consumption: fossil fuels (Dukes)</td>
<td>Ch. 13 Part 1</td>
<td></td>
</tr>
<tr>
<td>Dec. 30</td>
<td>Energy consumption: fossil fuels 2 (Dukes)</td>
<td>Week 15</td>
<td>Ch. 13 Part 2</td>
</tr>
<tr>
<td>Dec. 2</td>
<td>Energy conservation and alternatives: solar (Dukes)</td>
<td>Ch. 13 Part 3</td>
<td></td>
</tr>
<tr>
<td>Dec. 5</td>
<td>Energy alternatives: wind, nuclear power (Dukes)</td>
<td></td>
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<tr>
<td>Dec. 7</td>
<td>The big picture: Population, energy, climate, environment (Dukes)</td>
<td>Week 16</td>
<td></td>
</tr>
<tr>
<td>Dec. 9</td>
<td>Course wrap-up (all)</td>
<td></td>
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</tr>
</tbody>
</table>

**Dec 12-17** **FINAL EXAM PERIOD** - Date of final to be announced

### Assignments and Grading:

**Grading:**

- 3 (out of 4) Hour Exams @ 100 points = 300
- Comprehensive Final Exam* @ 100 points = 100
- Learn Smart** 13 modules @ 7 points = 91
- Lecture participation, iclicker @ 50 points = 50
- Class Participation*** @ 59 points = 59
- Total possible points 600

* Comprehensive Final Exam. The final exam will consist of two parts, Exam 4 and a comprehensive final. Each part will be worth 100 points. Your lowest or missing exam score (including Exam 4) will be dropped. The comprehensive portion of the final will not be dropped.

** LearnSmart modules. There are 13 modules, and each is worth 7 points, totaling 91 points.

*** Class participation. Class participation includes: in class assignments, home work, and case studies.

**Grading Scale:**

- A+ 98% and above, A 93-97.9%, A- 90-92.9%, B+ 87-89.9%, B 83-86.9%
- B- 80-82.9%, C+ 77-79.9%, C 73-76.9%, C- 70-72.9%, D+ 67-69.9%, D 63-66.9%, D- 60-62.9%, F below 59.9%
MAKEUP POLICY ON EXAMS: There are four exams and a comprehensive final exam. We will drop your lowest exam score; however, the final is comprehensive and may not be dropped. If you miss a test due to an emergency, talk to Dr. Graveel immediately. All makeups of the midterm exams must be done within a week of the regularly scheduled exam date.

LEARNSMART MODULES: We use LearnSmart, an online homework system to take the place of in-class quizzes. The system will be described in class. There is one module to review for each textbook chapter that is assigned. The good news is that most people who finish the modules get 100% of the points for this part of the class (which was not true for the quizzes); but it does require that you actually DO the online work. Also, keep in mind that access to Blackboard (which you will use to access the LearnSmart modules) and LearnSmart can go down unpredictably, so waiting until the last second to do the assignments is risky.

ICLICKER: One of the difficulties associated with teaching (and learning) in a large-enrollment class is that there is little ability for you to feel personally involved in the learning process. To combat this problem, we use the i>clicker2 to make the course more interactive. You will need an “i>clicker2” remote which can be purchased from the bookstores. Earlier i>clicker models will work, but other brands of clickers will not. If you purchase the textbook from the local bookstores, you may get a coupon that gets you a discount on the clicker. If you bought an i>clicker2 for another class or previous semester, you will be able to use it in this class. You need to register your clicker for use in this class, and there will be a link on the Blackboard course for you to do this. ***You should not go online to register your clicker outside of Blackboard.*** Although we will not use the clickers each day, we will use it at least twice a week after August 26. **You cannot get the class participation points if you do not register an i>clicker2 for use in this class.**

The clickers allow us to pose questions and have you answer them in class. The system tabulates your responses almost instantaneously, so we can show you the answers given by the entire class. We will use this system to offer opinions, answer review questions, go over difficult material, and otherwise provide feedback to things going on in class. We will not use the system to grade how you answer each specific question – in other words, it is not a way of quizzing you every day. Instead, we will get a summary of who answered each day – essentially you will be recorded as participating in the clicker sessions. **If you respond to at least 50% of the questions asked during a class session, then you will get the class participation point for that session.** Lower levels of participation will result in zero points.

A MAJOR POINT: **you cannot record your answers to the questions without the i-clicker2. So if you don’t bring it to class, you cannot earn the class participation point that day.** Some people feel that clickers are simply a way of taking attendance, but it is more than that – participating in the question-and-answer sessions helps you learn by promoting a more active learning style. That is why you have to have the clicker and use it to get the participation point – it is not enough to just be in the room and sit there. Even though we will not be using it each day, it would be best if you have it with you for every class. **MAJOR HINT:** DAYS BEFORE MAJOR HOLIDAYS OR CAMPUS SOCIAL EVENTS ARE GOOD DAYS TO BE PRESENT AND HAVE YOUR CLICKER WITH YOU. We do not use the clickers on days when we have an exam.
It is possible to grade the responses and give extra points for giving correct answers. We will do this occasionally as a way of earning extra credit. We can’t do it for all questions, because we ask some opinion questions for which there is no correct answer.

**ACADEMIC DISHONESTY:** Purdue has a strong policy against cheating, and we work to reduce the likelihood that you can successfully copy off of each other and otherwise try to avoid doing your own work during tests. See the following website for the Purdue policy: [http://www.purdue.edu/studentregulations/student_conduct/index.html](http://www.purdue.edu/studentregulations/student_conduct/index.html). Policies on how exams are administered will be explained in class before the first one. One point: **you will need a picture ID for all exams.** Students who cheat on tests will receive an F on that test and will most likely be expelled from the course with an F grade. All instances of cheating will be reported to the Dean of Students, and further disciplinary action at the university level (e.g., expulsion) is possible. Do not speak to other students during exams, even to translate words into another language for them. Notes and books are not allowed for any tests.

The clickers present a special problem. The way we use the system is designed to reward you for regular participation. However, some of you will be tempted to give your clicker to a classmate and let them record you as participating in the course. Be aware of the following policy: **IF ANYONE IS CAUGHT WITH MORE THAN ONE CLICKER IN CLASS, THE CLICKERS WILL BE CONFISCATED AND ALL PEOPLE INVOLVED WILL BE EXPelled FROM THE CLASS WITH AN ‘F’ GRADE.** Each clicker is registered for use in this class using its unique serial number, so it is no problem to identify those involved.

**STUDENTS WITH DISABILITIES:** If you have a disability that requires some special accommodation, please talk to Dr. Graveel in the first three weeks of the semester to discuss the instruction techniques in this class, tests or any other academic adjustments that you may need.

**DIVERSITY STATEMENT:** *In this course, each voice in the classroom has something of value to contribute. Please take care to respect the different experiences, beliefs and values expressed by students and staff involved in this course. We support Purdue’s commitment to diversity, and welcome individuals of all ages, backgrounds, citizenships, disability, sex, education, ethnicities, family statuses, genders, gender identities, geographical locations, languages, military experience, political views, races, religions, sexual orientations, socioeconomic statuses, and work experiences.*

**CLASS CITIZENSHIP:** A potential challenge of learning in a large lecture hall with hundreds of students is that there can be an enormous amount of distraction. In an undisciplined classroom, students talking, rustling through pages of the newspaper, surfing the web, or watching movies on their cell phones in your vicinity can make it nearly impossible to pay attention to the lecturer. The same goes for students whose cell phones ring in class. If the professor has to spend class time telling students to stop disrupting the class, it takes away from everyone’s time to learn. Please do your part and ask students around you who are causing disruptions to stop. If your friend is talking to you, tell them to wait until after class. If it gets to the point where we or the TA or proctors have to quiet you down or notice you watching something on your computer or phone, we may penalize you by subtracting points from your grade.

Another challenge of being part of a large class is that many students can be hesitant to ask or answer questions in front of so many of their peers. We recognize that you may be
reluctant to speak in class, but we encourage you to try to overcome this reluctance – your participation in class, and your willingness to ask what you may think are “stupid questions” will improve the experience for everyone – including us! At the end of the semester, we may award extra participation points to students who have consistently made useful contributions to the class discussion, or have otherwise taken initiative to improve the learning environment.

**EMERGENCY PREPARENESS PROCEDURES:**

Purdue University is a very safe campus and there is a low probability that a serious incident will occur here at Purdue. However, just as we receive a “safety briefing” each time we get on an aircraft, we want to emphasize our emergency procedures for evacuation and shelter in place incidents. Our preparedness will be critical IF an unexpected event occurs! Emergency preparedness is your personal responsibility. Purdue University is actively preparing for natural disasters or human-caused incidents with the ultimate goal of maintaining a safe and secure campus. Let’s review the following procedures:

- To report an emergency, call 911.
- To obtain updates regarding an ongoing emergency, and to sign up for Purdue Alert text messages, view [www.purdue.edu/ea](http://www.purdue.edu/ea)
- If we hear a fire alarm, we will immediately suspend class, evacuate the building, and proceed outdoors, and away from the building. **Do not use the elevator.**
- If we are notified of a Shelter in Place requirement for a tornado warning, we will suspend class and shelter in the lowest level of this building away from windows and doors.
- If we are notified of a Shelter in Place requirement for a hazardous materials release, or a civil disturbance, including a shooting or other use of weapons, we will suspend class and shelter in our classroom, shutting any open doors or windows, locking or securing the door, and turning off the lights.

**EMERGENCY PREPAREDNESS WEBSITE:**

**EMERGENCY:** In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. Here are ways to get information about changes in this course: the Blackboard online course, our department emails and our office phones (see top of syllabus).

**FURTHER INFORMATION ABOUT LEARNSMART / CONNECT:**

**ACCESS:** Connect is purchased online through the course Blackboard page. When you purchase Connect online, you will get an interactive eBook version of the required textbook for this course. If you prefer to purchase the text through the bookstore, you should get a Connect access codes packaged with the new textbook (however, this is much more expensive than purchasing the e-book online, see below). **NOTE:** You can register for a free trial period in Connect and have access to Learnsmart and the textbook without paying. **This trial period is for a limited time period (typically three weeks, so it won’t get you through the semester but might be an option if you have limited funds at the start).** If you prefer to read a hard copy of the textbook, you can select an option to purchase a looseleaf version of the text when you register for Connect (typically the looseleaf text costs $25 or less). Connect should cost about $85 (or $110 with the
looseleaf textbook). Hard copies of the textbook now cost over $200 but the access code is included so you won’t have to pay more for the Learnsmart program.

REGISTRATION: To register in Connect, please click on the first link for a Learnsmart module (textbook chapter) on the course Blackboard webpage. This will direct you to the publisher’s webpage. After you review your options, click “Register Now.”

SUPPORT & TIPS: Please review the “Registering for Connect (Learnsmart)” document (available on Blackboard) for help getting started with Connect and LearnSmart. If you have any issues while registering or using Connect, please contact McGraw-Hill’s Customer Experience team through http://www.mhhe.com/support or at 800-331-5094. To avoid problems related to unexpected technical issues, you are advised not to wait until the last moment to complete assignments. Do NOT contact the professors or your TA about problems with LearnSmart until you have tried to address them with McGraw-Hill staff. It is unlikely that we will be able to help you with this system as much as the help staff (after all, it’s their job!).
A. COURSES TO BE DELETED

YDAE 35900 Leadership in Developing the Agricultural Professional
Justification: Has not been taught in 5 years

YDAE 38500 Urban Service Learning
Justification: Has not been taught in 5 years

YDAE 64100 Agricultural Education Programs for Post-Secondary Students
Justification: Has not been taught in 5 years

B. COURSES TO BE ADDED

Prefix and Course Number: YDAE 43100
Title: Planning for International Engagement Methods

Course Description (with prerequisites): cr. 1, a team-based laboratory course for students who seek experience working with international partners to plan and conduct quality service-learning projects. Using established partner relationships, students will work with international partners to address hands-on, real-world, identified challenges to learn the principles of extension methodology and sustainable community development by integrating their discipline knowledge and technical skills from previous courses. Students will also learn the intercultural communication, market analysis, project design and planning, entrepreneurial business planning for micro-credit loans and business ventures, and cultural factors affecting community food security while they work in bi-national teams to determine how best to apply their classroom knowledge and experience to respond to partners’ needs and local resource.

Prefix and Course Number: YDAE 43110
Title: International Engagement Methods

Course Description: cr.1-3; Using established partner relationships, students will travel to and live in another country and work with host-country partners and students to learn the principles of extension methodology, community engagement resulting in sustainable development, and how to most effectively work with local leaders. Students will also learn the intercultural communication, entrepreneurial business planning, and cultural factors affecting community food security status while they work bi-national teams to determine how best to apply their classroom knowledge and experience.

Co- or Pre-requisite: YDAE 43100 Planning for International Engagement Methods
**Prefix and Course Number:** YDAE 43120  
**Title:** Evaluating International Engagement Methods

**Course Description:** cr. 1; designed for students who have just returned from the Engagement Methods for Int’ Food Security course or have previous experience working with our partners. In order 1) fully comprehend the impact of the experience and 2) foster true long-term relationships with and service to our partners, it is required to work on the our projects when we return. Matt McGregor, Former Exec. Dir. of Timmy Global Health told us that “It’s not really about the trip”, to it is essential that we accomplish:

1. Closure of trip experiences with partners and contacts – thank you’s and complete follow-up,
2. Reflection of Purdue student experiences and personal goals/follow-up actions
3. Promotion of food insecurity realities and opportunities for support
4. Planning, recommendations, and promotion of future service learning courses.

**Co- or Pre-requisite:** YDAE 43110 International Engagement Methods

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**Prefix and Course Number:** YDAE 545000  
**Title:** Teaching STEM through Agriculture, Food and Natural Resources

**Course Description:** cr. 3; The course focuses on the background and history of STEM movement and agricultural education, contemporary models, strategies, and justification for incorporation of science, technology, engineering and mathematics (STEM) concepts and practices into K-12 formal and non-formal agricultural education programs. Consider and develop the best practices for STEM teaching and learning and enhancement of STEM content in agriculture, food and natural resources context. The goal of the course is to help students develop knowledge about STEM integration and equip them with teaching knowledge and skills for designing K-12 formal or non-formal lesson plans by using agriculture, food and natural resources as context. Students will learn strategies that promote engagement in STEM integrated activities in agricultural education. At the end of the course, students should be able to design and implement research-based STEM integrated lesson plans and assessment plans.

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**C. COURSES TO BE CHANGED**

None

**D. CURRICULAR CHANGES**
Supporting Document

YDAE 43100 Planning for International Engagement Methods

Semester(s) Offered:  Fall and Spring

Schedule Type (e.g. Lecture/Lab) and Hours:  Lab

Credits:  1 credit

A. Justification for the course:
This is the first course in a series of courses in which students will prepare for and participate in cultural learning experiences which cause them to apply classroom knowledge and science technologies through education methodologies to assist partners address their economic and social challenges. This course prepares students to apply their knowledge to engage in the educational engagement activities of an international service-learning experience. Students will develop and apply intercultural knowledge and effectiveness to communicate, understand and work and live with people of differing cultural communities. The skills learned in this course will prepare the students to work constructively as part of a bi-national problem-solving teams in cultural appropriate ways.

B. Learning Outcomes and Methods of Assessment

i. Applicable to University Core Curriculum
This course ☒ will ☐ will not be nominated for inclusion on University Foundational Core. If no, skip to section ii.

<table>
<thead>
<tr>
<th>Foundational Learning Outcomes</th>
<th>Check all that apply</th>
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<tbody>
<tr>
<td>1. Written Communication</td>
<td>☐</td>
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<tr>
<td>2. Information Literacy</td>
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<tr>
<td>3. Oral Communication</td>
<td>☐</td>
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<tr>
<td>4. Science</td>
<td>☐</td>
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<tr>
<td>5. Science, Technology and Society</td>
<td>☐</td>
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<tr>
<td>6. Mathematics/Quantitative Reasoning</td>
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<tr>
<td>7. Human Cultures: Humanities</td>
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<tr>
<td>8. Human Cultures: Behavioral &amp; Social Sciences</td>
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ii. **Applicable to College of Agriculture Core**

This course ☐ **will** ☒ **will not** be nominated for inclusion on College of Agriculture Core. If no, skip to section iii.

<table>
<thead>
<tr>
<th>College of Agricultural Core</th>
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<tbody>
<tr>
<td>1. Mathematics and Sciences</td>
<td>☐</td>
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<tr>
<td>2. Written and Oral Communication</td>
<td>☐</td>
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<tr>
<td>3. Humanities and Social Sciences</td>
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<td>4. Multicultural Awareness</td>
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<td>5. International Understanding</td>
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<td>6. Capstone</td>
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iii. **Graduate Learning Outcomes (for 50000 and 60000 level courses only)**

<table>
<thead>
<tr>
<th>Graduate Learning Outcomes</th>
<th>Check all that apply</th>
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</thead>
<tbody>
<tr>
<td>1. Advance Knowledge and Scholarship</td>
<td>☐</td>
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<tr>
<td>2. Demonstrate Critical Thinking and Problem Solving</td>
<td>☐</td>
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<tr>
<td>3. Exhibit Ethical Conduct</td>
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<tr>
<td>4. Communicate Effectively</td>
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<tr>
<td>5. Develop Professionalism</td>
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</table>

iv. **Describe course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.)**

Through this course series, students will prepare for and participate in cultural learning experiences which cause them to:

- apply classroom knowledge and science technologies through extension methodologies to assist partners in addressing their economic and social challenges;
- demonstrate intercultural knowledge and effectiveness to successfully communicate, understand, and interact among people with differing assumptions that exist because of ethnic and cultural differences;
- demonstrate critical thinking and emotional intelligence in evaluation of what is read and heard by using data and reasoning to identify and assess opportunities and develop sound responses to complex problems in a rural international village setting;
- demonstrate the ability to communicate persuasively and while considering audience and purpose in a different cultural setting;
- assess the partners’ needs, plan, present, and assess educational programs in Haiti, and
- demonstrate the ability to work constructively as part of a bi-national problem-solving team.
v. Methods of evaluation or assessment: (example only)

<table>
<thead>
<tr>
<th>Methods of assessment</th>
<th>Check all that apply</th>
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</thead>
<tbody>
<tr>
<td>1. exams and quizzes</td>
<td>☒</td>
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<tr>
<td>2. assessment and scoring of in class participation</td>
<td>☒</td>
</tr>
<tr>
<td>3. assignments</td>
<td>☒</td>
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<tr>
<td>4. class presentations</td>
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<tr>
<td>5. Other (specify)</td>
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</table>

Professional Preparation & Participation 35%

1. **Attendance (5%)** – There is no textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved. Attendance counts 2.

2. **“Preflection” on Haiti Experiences and Expertise (5%)** – how prepared are we now?

3. **Sojourn Readiness Assessment (SRA) (5%)** – only travelers - How ready are you? This short survey will help you address issues regarding your expectations and preparation for Winterbreak.

4. **Who am I? – Social/Cultural Identity (5%)** - How do I form my worldview? This is a short self-identity worksheet and 400-word reflection assignment to assist you in thinking about who you are and that you have a culture which is the foundation of your view of the world.

5. **Haitien Video Pirate Teams (10%)** – working within the project teams, students are responsible for locating and introducing a video clip of no more than four minutes and three minutes intro/discussion at the beginning of the class. This should reflect an interesting aspect of culture in Haiti. Within a week of your presentation a 250-word abstract reflection responding to these three prompts below.
   a. Each student team selects a cultural video and exhibits the critical thinking that caused the video to be chosen
   b. Students discuss how this video is different than home and
   c. How this difference impacts the approach to our challenge/project.

   Schedule:
6. **Cultural PPTx** 10%
These topics will be assigned to **those students travelling** in the first week of class and they will prepare a one-slide PPTx highlighting 3-5 significant facts and ideas that we should know about our stakeholders/partners. These will be presented (10%) on 09/07 and 9/14 and uploaded to Blackboard (5%)

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</table>

7. **Team Project Presentations – week 7 (20%) and 15 (20%)** 45%
Presentation to reviewers external to the team to provide feedback on the design and the process.

**Team Projects**

1. **Symposium Science Project Presentation** – each assigned team of 3-4 students will be responsible for researching, planning, and then designing an educational presentation on their topic to present through PPTx presentation and posters at the symposium.

2. **Hands-on Demonstration** – each assigned team of 3-4 students will be responsible for determining the local audience, planning a practical hands-on demonstration, and defining the material/equipment needed, and ordering the supplies to conduct a 30-45 activity with Haitien students whenever opportunities arise and at the symposium.

**Peer and Team Performance Evaluations** 10%
C. Prerequisites
Click here to enter text.

D. Course Instructor and Contact Information
Course Leadership:  Mark Russell, YDAE, 765-494-8423, mrussell@purdue.edu
Elizabeth Byers, YDAE, 765-494-0166, ebyers@purdue.edu

E. Reading List (include course text)
There is no textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved.

F. Example of Course Syllabus

**Proposed YDAE 43100**
Planning for International Engagement Methods
Example Preparing Syllabus

**Course Description:** cr. 1, a team-based laboratory course for students who seek experience working with international partners to plan and conduct quality service-learning projects. Using established partner relationships, students will work with international partners to address hands-on, real-world, identified challenges to learn the principles of extension methodology and sustainable community development by integrating their discipline knowledge and technical skills from previous courses. Students will also learn the intercultural communication, market analysis, project design and planning, entrepreneurial business planning for micro-credit loans and business ventures, and cultural factors affecting community food security while they work in bi-national teams to determine how best to apply their classroom knowledge and experience to respond to partners’ needs and local resource constraints.

**Course Leadership:**  Mark Russell, YDAE, 765-494-8423, mrussell@purdue.edu  
Elizabeth Byers, YDAE, 765-494-0166, ebyers@purdue.edu

**Teaching Assistants:**  Lauren Brizgys, YDAE MS student, lbrizgys@purdue.edu  
Christa Cheatham, cheathac@purdue.edu – Blackboard assignments  
Alacyn Cox, cox102@purdue.edu – class management  
Rachel Stowers, rstowers@purdue.edu – team assistance

**Time and Room:**  Wednesdays, 3:30-5:20, REC 108; then team breakout locations

**Partners:**
- **Université Anténor Firmin** (UNAF); Gedeon Eugene, President, unafcap@yahoo.fr  
  Lead science teacher – Jodbelem Chery, jodbelemchery490@yahoo.com
- **Centre technique d’entreprenariat agricole et de Développement (CTEAD);**  
  Jean-Claude Pierre-Louis, Director, le_sagepl@hotmail.com
- Pierre Phistin, General Intendent, Universite la Renaissance d’Haiti, jsteah.pierre@gmail.com
- Heifer International; Ewadly Estil, Northern Director, Ewaldy.ESTIL@heifer.org
- **Haitian Children’s Aid (A.E.N.HA Aide à l’Enfance Haitienne) orphanage in Morne Rouge,**  
  Marie Jose, laguerremi@yahoo.de, 509-38356414;
Course Learning Objectives: through this course series, students will prepare for and participate in cultural learning experiences which cause them to:

- apply classroom knowledge and science technologies through extension methodologies to assist partners in addressing their economic and social challenges;
- demonstrate intercultural knowledge and effectiveness to successfully communicate, understand, and interact among people with differing assumptions that exist because of ethnic and cultural differences;
- demonstrate critical thinking and emotional intelligence in evaluation of what is read and heard by using data and reasoning to identify and assess opportunities and develop sound responses to complex problems in a rural international village setting;
- demonstrate the ability to communicate persuasively and while considering audience and purpose in a different cultural setting;
- assess the partners’ needs, plan, present, and assess educational programs in Haiti, and
- demonstrate the ability to work constructively as part of a bi-national problem-solving team.

Emergency:
In the event of a major emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised course program schedule or other circumstances beyond the instructor’s control. To get information about changes in this course, contact one of us at the contact information above.

Students with Disabilities: If you have a documented academic disability, please notify the instructor at the beginning of the semester to ensure appropriate accommodations can be made during lectures and exams. All communication between students and the instructor will be strictly confidential.

Nondiscrimination - Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture diversity. The University believes that diversity among its many members strengthens the institution, stimulates creativity, promotes the exchange of ideas, and enriches campus life. Purdue University prohibits discrimination against any member of the University community on the basis of race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a veteran. The University will conduct its programs, services and activities consistent with applicable federal, state and local laws, regulations and orders and in conformance with the procedures and limitations as set forth in (http://www.purdue.edu/purdue/ea_eou_statement.html) which provides specific contractual rights and remedies.

Class Schedule:
Start each lab session with pre-trip and correspondence announcements, a cultural video, and topic of the day, then teams work the remainder of the time in locations of your choice.

<table>
<thead>
<tr>
<th>DATE</th>
<th>Week</th>
<th>Wednesday topics</th>
<th>Assignments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 24</td>
<td>1</td>
<td>Course Introduction: Student intro’s and pictures</td>
<td>“Preflection” on Haiti Experiences and Expertise Forms</td>
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<td></td>
<td></td>
<td>Review reflections of former students</td>
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<tr>
<td>Date</td>
<td>Event Description</td>
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<tr>
<td>Aug. 31</td>
<td>Haiti projects discussion panel with previous Winter break students Assign Cultural Worldview Frameworks topics Assign project teams &amp; leadership selections</td>
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<td>Sept. 7</td>
<td>Present Cultural Worldview Framework PPTx topics Why Cap Haitien area? Work in teams</td>
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<td>Sept. 14</td>
<td>Present Cultural Worldview Framework PPTx topics Principles of Sustainable Development Methods Work in teams</td>
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<td>Sept. 21</td>
<td>IPIA Orientation visit – Kara Hartman Work in teams</td>
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<td>Sept. 28</td>
<td>Work in teams</td>
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<td>Oct. 5</td>
<td>Mid-Semester Progress Reviews of Project Deliverables and Symposium Plans</td>
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<td>Oct. 12</td>
<td>One on one feedback/performance reviews Work in teams &amp; respond to mid-semester review</td>
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<tr>
<td>Oct. 19</td>
<td>Quiz 1 – Cultural Worldview Framework PPTx One on one feedback/performance reviews Work in teams</td>
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<tr>
<td>Oct. 26</td>
<td>Work in teams</td>
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<td>Nov. 2</td>
<td>Introduction à la Créole Work in teams</td>
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<td>Nov. 9</td>
<td>Work in teams discuss Tenants of Behavior</td>
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<td>Nov. 16</td>
<td>Finalize documentation and material needs Present you Agri-Symposium lecture and lab outline</td>
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<tr>
<td>Nov. 23</td>
<td>Thanksgiving</td>
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<tr>
<td>Nov. 30</td>
<td>Materials printed and supplies ordered Work in teams</td>
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<tr>
<td>Dec. 7</td>
<td>Present Agri-Symposium Presentations and Hands-on Demonstrations</td>
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<tr>
<td>Dec. 12 - 16</td>
<td>Pick up printed deliverables, materials and supplies</td>
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</table>

### Academic Integrity

It is expected that your team enterprise presentations will be responsive to and incorporate the ideas and proposals of our partners, the reports from former winter break student teams, and data relevant to northern Haiti. You will be citing many sources and other people’s information. As with any and all courses at Purdue University, it is vitally important that each of you operate with complete academic integrity. Quotes from the written work of others should be appropriately cited, and all written work should be your own creation (except for citations). Failure to adhere to norms of academic integrity can lead to penalties such as failing the course or suspension from the university.

### Grading/Assignments for all students:
Professional Preparation & Participation 35%

8. Attendance (5%) – There is no textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved. Attendance counts.

9. “Preflection” on Haiti Experiences and Expertise (5%) – how prepared are we now?

10. Sojourn Readiness Assessment (SRA) (5%) – only travelers - How ready are you? This short survey will help you address issues regarding your expectations and preparation for Winterbreak.

11. Who am I? – Social/Cultural Identity (5%) - How do I form my worldview? This is a short self-identity worksheet and 400-word reflection assignment to assist you in thinking about who you are and that you have a culture which is the foundation of your view of the world.

12. Haitian Video Pirate Teams (10%) – working within the project teams, students are responsible for locating and introducing a video clip of no more than four minutes and three minutes intro/discussion at the beginning of the class. This should reflect an interesting aspect of culture in Haiti. Within a week of your presentation a 250-word abstract reflection responding to these three prompts below.
   a. Each student team selects a cultural video and exhibits the critical thinking that caused the video to be chosen
   b. Students discuss how this video is different than home and
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   Schedule:

13. Cultural PPTx 10%
These topics will be assigned to those students travelling in the first week of class and they will prepare a one-slide PPTx highlighting 3-5 significant facts and ideas that we should know about our stakeholders/partners. These will be presented (10%) on 09/07 and 9/14 and uploaded to Blackboard (5%)

14. Team Project Presentations – week 7 (20%) and 15 (20%) 45%
Presentation to reviewers external to the team to provide feedback on the design and the process.

Specific Team Leadership Possibilities

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**Peer and Team Performance Evaluations** 10%

**Grading**

Using the above assignments, your grade will be based on the following grading scale:

A 90-100%; B 80-89%; C 70-79%; D 60-69%; F 0-59%
Supporting documents

YDAE 43110 International Engagement Methods (Short-term, Faculty-led, Study Abroad)
Semester(s) Offered: Fall/ Spring/ Summer

Schedule Type (e.g. Lecture/Lab) and Hours: Experiential

Credits: 1-3 credits

A. Justification for the course:
This international service-learning course will engage students in cultural learning experiences with local host partners who will expect them to apply classroom knowledge and science technologies through education methodologies to assist in-country partners with their economic, health, and social challenges. This course enables students to apply their knowledge to engage in the educational engagement activities of an international service-learning experience. Students will develop and apply intercultural knowledge and effectiveness to communicate, understand and work and live with people of differing cultural communities. The skills learned in this course will prepare the students to work constructively as part of a bi-national problem-solving teams in cultural appropriate ways in their workplaces and life communities.

B. Learning Outcomes and Methods of Assessment

i. Applicable to University Core Curriculum
This course ☒ will ☐ will not be nominated for inclusion on University Foundational Core. If no, skip to section ii.

<table>
<thead>
<tr>
<th>Foundational Learning Outcomes</th>
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<td>3. Oral Communication</td>
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<tr>
<td>4. Science</td>
<td>☐</td>
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<tr>
<td>5. Science, Technology and Society</td>
<td>☐</td>
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<tr>
<td>6. Mathematics/Quantitative Reasoning</td>
<td>☐</td>
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<tr>
<td>7. Human Cultures: Humanities</td>
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<tr>
<td>8. Human Cultures: Behavioral &amp; Social Sciences</td>
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</table>
ii. Applicable to College of Agriculture Core

This course ☐ will ☒ will not be nominated for inclusion on College of Agriculture Core. If no, skip to section iii.

<table>
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<td>1. Mathematics and Sciences</td>
<td>☐</td>
</tr>
<tr>
<td>2. Written and Oral Communication</td>
<td>☐</td>
</tr>
<tr>
<td>3. Humanities and Social Sciences</td>
<td>☐</td>
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<tr>
<td>4. Multicultural Awareness</td>
<td>☐</td>
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<tr>
<td>5. International Understanding</td>
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<tr>
<td>6. Capstone</td>
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</table>

iii. Graduate Learning Outcomes (for 50000 and 60000 level courses only)

<table>
<thead>
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<th>Graduate Learning Outcomes</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. Advance Knowledge and Scholarship</td>
<td>☐</td>
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<tr>
<td>2. Demonstrate Critical Thinking and Problem Solving</td>
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<tr>
<td>3. Exhibit Ethical Conduct</td>
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<tr>
<td>4. Communicate Effectively</td>
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<tr>
<td>5. Develop Professionalism</td>
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</table>

iv. Describe course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.)

**Course Learning Objectives:** through this course series, students will prepare for and participate in global transformational learning experiences which cause them to:

- apply classroom knowledge and science technologies through extension methodologies to assist partners in addressing their challenges;
- demonstrate intercultural knowledge and effectiveness to successfully communicate, understand, and interact among people with differing assumptions that exist because of ethnic and cultural differences;
- demonstrate personal growth in cultural worldview and self-awareness to confidently address specific food security-related challenges and belief in their personal ability to succeed in a particular situation;
- demonstrate critical thinking, intercultural curiosity, and evaluation of what is read and heard by using data and reasoning to identify and assess opportunities and develop sound responses to complex problems in a rural international village setting;
- demonstrate the ability to communicate persuasively while considering audience and purpose in a different cultural setting;
- assess the partners’ needs, plan, present, and assess educational programs in Haiti,
o demonstrate intercultural openness, empathy, flexibility, and open-mindedness to work constructively as part of a bi-national problem-solving team.

v. Methods of evaluation or assessment:

<table>
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<th>Methods of assessment</th>
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<tbody>
<tr>
<td>1. exams and quizzes</td>
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<tr>
<td>2. assessment and scoring of in class participation</td>
<td>☒</td>
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<tr>
<td>3. assignments</td>
<td>☒</td>
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<tr>
<td>4. class presentations</td>
<td>☒</td>
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<tr>
<td>5. Other (specify):</td>
<td>Click here to enter text.</td>
</tr>
</tbody>
</table>

Individual Professional Participation

- **Attendance** – There is no single textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved. Attendance counts. (5%)  
- **Punctuality on trip** – Out of respect to our hosts and to fellow students, each individual must take personal responsibility to be on time for and ready to make a positive contribution to all activities. (5%)

Individual Participation and Reports

- **Complete both** the Pre-experience Intercultural Attitudes, Skills, and Knowledge Short Scale Plus (A.S.K.S²) and the Civic Engagement Short Scale Plus (C.E.S²) assessment at the first class meeting in Miami. (10%)
- **Group Reflection and debriefing sessions** – all students are required to contribute to nightly class discussions and reflections. Some will choose to lead and others comment. (10%)
- **Daily journal** – All students will be expected to record observations related to project and cultural differences each day in their HAITI Notebooks. These will be collected and returned frequently by the course instructors; (10%)
- **Guided Reflection Journals** – three journals (12/28, 1/02, 1/06) will require all students to respond to specific questions rather than the daily journals during the trip. (15%)
- **Begin to collect data for next semester assignments** - an individual video or reflective PowerPoint with pictures presentation and posted to Blackboard (Jan 29) (10%)  
  AND a **750-word Snapshot Abstract submitted to (PJSRL)**, (February 10)
  The Purdue Journal of Service-Learning [http://docs.lib.purdue.edu/pjsl/](http://docs.lib.purdue.edu/pjsl/) (10%)

Team Service Project

- **Team Performance** - Each student will perform the service-learning project with their bi-national team as directed by our hosts. Each team will work with a local leader in the village and each student will be expected to contribute to the project plan, design, analysis, execution, and performance assessment. Students will be evaluated on how the project actually performed and how the team itself functioned – both internally and externally. (5%)
- **International Agri-Symposium** – (Interactions with Partners and Feedback) Each project team will organize, deliver, and evaluate the effectiveness of their presentation/demonstration. Topics will include Chemistry, Biodigester, Poultry Management, Soil Analysis, Food Technology, and Food Science. (10%)
(Team Project Documentation uploaded to your team Blackboard by January 15
Update your project revision of history and status of project, the project charter, project timeline,
and draft timeline for next semester and relationship to the overall partner relationship and goals.

Student Team Reflective Article – 3,000-word essay with five color images March 30.
with captions/which explain your team and class your team will focus on one of the following six
topics: 1) Agr-Symposium itself, 2) all six projects, 3) the partners and their goals, 4) UNAF facilities,
sizes, and purposes, 5) Cap Haitian and community, and 6) use in the Haitian culture. Submitted to The
Purdue Journal of Service-Learning (PJSL). http://docs.lib.purdue.edu/pjsl/

C. Prerequisites: YDAE 43100 Planning for International Engagement Methods

D. Course Instructor and Contact Information

Course Leadership: Mark Russell, YDAE, 765-494-8423, mrussell@purdue.edu
Elizabeth Byers, YDAE, 765-494-0166; ebyers@purdue.edu
Teaching Assistant: YDAE Graduate Student

E. Reading List (include course text)

There is no textbook or source of information. The instructors and
each of you will be sharing information from many sources. The only way that you can learn
and contribute to this environment is to be present and actively involved.

F. Example of Course Syllabus

Proposed YDAE 43110
International Engagement Methods
Short-term Study Abroad
Example Syllabus

Course Description: cr.1-3; Using established partner relationships, students will travel to and
live in another country and work with host-country partners and students to learn the principles
of extension methodology, community engagement resulting in sustainable development, and
how to most effectively work with local leaders. Students will also learn the intercultural
communication, entrepreneurial business planning, and cultural factors affecting community
food security status while they work bi-national teams to determine how best to apply their
classroom knowledge and experience.

Co- or Pre-requisite: YDAE 43100 Planning for International Engagement Methods

Course Fee: The IPIA process of establishing a SA program fee will be used to determine the
course fee for this course.

Course Leadership: Mark Russell, YDAE, 765-494-8423, mrussell@purdue.edu
Elizabeth Byers, YDAE, 765-494-0166; ebyers@purdue.edu
Teaching Assistant: YDAE Graduate Student
Partners:
- Université Anténor Firmin (UNAF) in Cap-Haitien; Gedeon Eugene, President, unafcap@yahoo.fr
  Lead science teacher – Jodbelem Chery, jodbelemchery490@yahoo.com
- Centre technique d’entreprenariat agricole et de Développement (CTEAD); Jean-Claude Pierre-Louis, Director, le_sagepl@hotmail.com
- Pierre Phistin, General Intendent, Universite la Renaissance d’ Haiti, isteah.ppierre@gmail.com
- Heifer International; Ewadly Estil, Northern Director, Ewaldy.ESTIL@heifer.org
- Eternal Hope for Haiti, lucylou6@gmail.com and angela.haynes-ferere@emory.edu
- Dr. Patricia Wolfe, Meds & Food for Kids, www.mfkhaiti.org, pwolff@mfkhaiti.org
- North Coast Farms & Community Development, Arry Still, Manager, arrystill@yahoo.fr

Schedule and Time: The actual trip will be Dec 28, 2016 through January 6, 2017 in Cap-Haitien and surrounding appropriate agricultural project locations/villages. (2015-16 program is available)

Target Student Population
Purdue University students interested in enabling families to attain food security and make lasting improvements in their quality of life and self-reliance. This is accomplished through direct village engagement and an International Agri-Symposium for students. Open to those 20 students who have satisfactorily completed the Preparing for Haiti Fall course.

Host Partners:
- Université Anténor Firmin (UNAF) in Cap-Haitien; Gedeon Eugene, President, unafcap@yahoo.fr
  Lead science teacher – Jodbelem Chery, jodbelemchery490@yahoo.com
- Centre technique d’entreprenariat agricole et de Développement (CTEAD); Jean-Claude Pierre-Louis, Director, le_sagepl@hotmail.com
- Pierre Phistin, General Intendent, Universite la Renaissance d’ Haiti, isteah.ppierre@gmail.com
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- Dr. Patricia Wolfe, Meds & Food for Kids, www.mfkhaiti.org, pwolff@mfkhaiti.org
- North Coast Farms & Community Development, Arry Still, Manager, arrystill@yahoo.fr

Course Learning Objectives: through this course series, students will prepare for and participate in global transformational learning experiences which cause them to:
- apply classroom knowledge and science technologies through extension methodologies to assist partners in addressing their challenges;
- demonstrate intercultural knowledge and effectiveness to successfully communicate, understand, and interact among people with differing assumptions that exist because of ethnic and cultural differences;
- demonstrate personal growth in cultural worldview and self-awareness to confidently address specific food security-related challenges and belief in their personal ability to succeed in a particular situation;
demonstrate critical thinking, intercultural curiosity, and evaluation of what is read and heard by using data and reasoning to identify and assess opportunities and develop sound responses to complex problems in a rural international village setting;

- demonstrate the ability to communicate persuasively while considering audience and purpose in a different cultural setting;

- assess the partners’ needs, plan, present, and assess educational programs in Haiti, and

- demonstrate intercultural openness, empathy, flexibility, and open-mindedness to work constructively as part of a bi-national problem-solving team.

Assignments:

Individual Professional Participation 10%

Attendance – There is no single textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved. Attendance counts. (5%)

Punctuality on trip – Out of respect to our hosts and to fellow students, each individual must take personal responsibility to be on time for and ready to make a positive contribution to all activities. (5%)

Individual Participation and Reports 45%

Complete both the Pre-experience Intercultural Attitudes, Skills, and Knowledge Short Scale Plus (A.S.K.S²) and the Civic Engagement Short Scale Plus (C.E.S²) assessment at the first class meeting in Miami. (10%)

Group Reflection and debriefing sessions – all students are required to contribute to nightly class discussions and reflections. Some will chose to lead and others comment. (10%)

Daily journal – All students will be expected to record observations related to project and cultural differences each day in their HAITI Notebooks. These will be collected and returned frequently by the course instructors; (10%)

Guided Reflection Journals – three journals (12/28, 1/02, 1/06) will require all students to respond to specific questions rather than the daily journals during the trip. (15%)

Begin to collect data for next semester assignments - an individual video or reflective PowerPoint with pictures presentation and posted to Blackboard (Jan 29) (10%)

AND a 750-word Snapshot Abstract submitted to (PJSL), (February 10) The Purdue Journal of Service-Learning http://docs.lib.purdue.edu/pjsl/ (10%)

Both of these documents must address the following items:

a. How has your opinion/impression of Haiti/Cap Haitian changed as a result of the trip?

b. How did the community engagement/service projects contribute to the challenges and goals of our hosts? Briefly describe the experience(s) being discussed.

c. How did this service learning experience affect permanent awareness, attitudes, or behavior change in you?

d. What three transferable skills did you develop/strengthen while preparing and working in Haiti? Give specific examples/situations of how this occurred

e. How will these skills/attributes benefit your career and life effectiveness?

f. Oh, I see you went to Haiti for a Study Abroad class over Winterbreak.

g. Tell me about that experience. How was it? (2-3 sentences only)

Team Service Project 45%

Team Performance - Each student will perform the service-learning project with their bi-national team as directed by our hosts. Each team will work with a local leader in the village and each student will be expected to contribute to the project plan, design, analysis, execution, and performance assessment.

Students will be evaluated on how the project actually performed and how the team itself functioned – both internally and externally. (5%)
International Agri-Symposium – (Interactions with Partners and Feedback) Each project team will organize, deliver, and evaluate the effectiveness of their presentation/demonstration. Topics will include Chemistry, Biodigester, Poultry Management, Soil Analysis, Food Technology, and Food Science. (10%)

(Team Project Documentation uploaded to your team Blackboard by January 15
Update your project revision of history and status of project, the project charter, project timeline, and draft timeline for next semester and relationship to the overall partner relationship and goals. Include in your Word docx with links and/or references to resources and data including responses to these prompts:

a. Describe participants in or related to your team projects in detail with pictures, descriptions, names, emails, and goals. Get actual measurements of resources. Include pictures of facilities inside and outside.

b. Document at least 3 potential “champions” of people who might be able to run the projects when you are done.

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c. Describe the current facilities/equipment/environments that you observed when you were interacting with your participants, their businesses and their families. Include GPS locations and also the locations where materials and supplies can be purchased.

d. What are the real strengths/opportunities/resources/assets present with this industry/community situation that can be used to improve their livelihoods?

e. How were your observations different than you have learned in class? What are the barriers/threats hindering improved livelihoods?

f. What exactly did your team end up presenting and how did you present? What worked well – what didn’t?

g. What were the reactions of the participants to your workshop/presentation/ ideas? What might you have changed? Why? Include the impact assessment/survey results.

h. What service projects do you suggest in addition to the field demonstrations and symposium presentations for the next Purdue visit? Why?

i. What new information about our partners and the people they serve did you learn that changes/supports our efforts in the future?

j. What short term steps/projects do you recommend for your team next year to build long-term trusting relationships? What projects should be continued/discontinued and why?

Student Team Reflective Article –3,000-word essay with five color images March 30.
with captions/which explain your team and class your team will focus on one of the following six topics: 1) Agr-Symposium itself, 2) all six projects, 3) the partners and their goals, 4) UNAF facilities, sizes, and purposes, 5) Cap Haitian and community, and 6) use in the Haitian culture.
Submitted to The Purdue Journal of Service-Learning (PJSL), http://docs.lib.purdue.edu/pjsl/

Academic Integrity
As with any and all courses at Purdue University, it is vitally important that each student operate with complete academic integrity. Quotes from the written work of others should be appropriately cited, and all written work should be the student’s own creation (except for citations). Failure to adhere to norms of academic integrity can lead to penalties such as failing the course or suspension from the university.

Grading
Using the above assignments, grades will be based on the following grading scale:
A 90-100%; B 80-89%; C 70-79%; D 60-69
Supporting Documents

YDAE 43120 Evaluating International Engagement Methods
Semester(s) Offered: Fall/ Spring/ Summer

Schedule Type (e.g. Lecture/Lab) and Hours: Lab

Credits: 1 credit

G. Justification for the course:
This third part of the course series is designed for the students that have participated in the cultural service-learning experiences with partners as part of a bi-national problem-solving team to fully comprehend the impact of the experience and foster true long-term relationships with and service to our partners. Using the methodologies and critical thinking learned in working with partners in addressing their economic and social challenges students will evaluate how the service learning experience affected permanent awareness, attitudes or behavior changes in themselves and contributions to the challenges and goals of the communities they served. Students will continue to work on the sustaining projects and serve as the bridge from one service-learning engagement opportunity to the next in-country opportunities to deliver services and to evaluate the culturally appropriate impact of their service projects. The skills learned in this course will prepare the students to work constructively as part of a bi-national problem-solving team in cultural appropriate ways in their workplaces and life communities.

H. Learning Outcomes and Methods of Assessment

i. Applicable to University Core Curriculum
This course ☒ will ☐ will not be nominated for inclusion on University Foundational Core. If no, skip to section ii.

<table>
<thead>
<tr>
<th>Foundational Learning Outcomes</th>
<th>Check all that apply</th>
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<tbody>
<tr>
<td>1. Written Communication</td>
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<td>2. Information Literacy</td>
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<tr>
<td>3. Oral Communication</td>
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<td>4. Science</td>
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<td>5. Science, Technology and Society</td>
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<tr>
<td>6. Mathematics/Quantitative Reasoning</td>
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<tr>
<td>7. Human Cultures: Humanities</td>
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<tr>
<td>8. Human Cultures: Behavioralal &amp; Social Sciences</td>
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</tbody>
</table>
ii. **Applicable to College of Agriculture Core**

This course ☐ will ☒ will not be nominated for inclusion on College of Agriculture Core. If no, skip to section iii.

<table>
<thead>
<tr>
<th>College of Agricultural Core</th>
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<tbody>
<tr>
<td>1. Mathematics and Sciences</td>
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<tr>
<td>2. Written and Oral Communication</td>
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<tr>
<td>3. Humanities and Social Sciences</td>
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<td>4. Multicultural Awareness</td>
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<td>5. International Understanding</td>
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<td>6. Capstone</td>
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iii. **Graduate Learning Outcomes (for 50000 and 60000 level courses only)**

<table>
<thead>
<tr>
<th>Graduate Learning Outcomes</th>
<th>Check all that apply</th>
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<tbody>
<tr>
<td>1. Advance Knowledge and Scholarship</td>
<td>☐</td>
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<td>2. Demonstrate Critical Thinking and Problem Solving</td>
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<td>3. Exhibit Ethical Conduct</td>
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<td>4. Communicate Effectively</td>
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<tr>
<td>5. Develop Professionalism</td>
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</table>

iv. **Describe course objectives and student learning outcomes that address the objectives (i.e., knowledge, communication, critical thinking, ethical research, etc.)**

**Course Learning Objectives:** through this course series, students will prepare for and participate in cultural learning experiences which cause them to:

- apply classroom knowledge and science technologies through extension methodologies to assist partners in addressing their economic and social challenges;
- demonstrate intercultural knowledge and effectiveness to successfully communicate, understand, and interact among people with differing assumptions that exist because of ethnic and cultural differences;
- demonstrate critical thinking and evaluation of what is read and heard by using data and reasoning to identify and assess opportunities and develop sound responses to complex problems in a rural international village setting;
- demonstrate the ability to communicate persuasively and while considering audience and purpose in a different cultural setting;
- assess the partners’ needs, plan, present, and assess educational programs in Haiti, and demonstrate the ability to work constructively as part of a bi-national problem-solving team.
v. **Methods of evaluation or assessment:**

<table>
<thead>
<tr>
<th>Methods of assessment</th>
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<tbody>
<tr>
<td>1. exams and quizzes</td>
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<td>2. assessment and scoring of in class participation</td>
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<td>3. assignments</td>
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<td>4. class presentations</td>
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<tr>
<td>5. Other (specify): Click here to enter text.</td>
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</table>

**Team Assessments**  

15. **Team Project Documentation uploaded to your team Dropbox by January 15**  
Update your project revision of history and status of project, the project charter, project timeline, and draft timeline for next semester and relationship to the overall partner relationship and goals.

16. **Student Room Team Reflective Article** – a 3,000-word essay with five color images w/captions by **March 30** which explains one of the following topics: 1) Agr-Symposium itself, 2) the partners and their goals, 3) UNAF facilities, sizes, and purposes, 4) Cap Haitian and community, and 5) us in the Haitian culture to instructors and submitted to The Purdue Journal of Service-Learning (PJSL), [http://docs.lib.purdue.edu/pjsl/](http://docs.lib.purdue.edu/pjsl/)  
(10%)

17. **Student Room Team Promotion Video** on one of the following topics: 1) Agr-Symposium itself, 2) the partners and their goals, 3) UNAF facilities, sizes, and purposes, 4) Cap Haitian and community, and 5) us in the Haitian culture to instructors. Your 3-4 minute video will be edited and submitted to IPIA by **April 13**.  
(20%)

**Individual Professional Preparation & Participation**  

1. Attendance (5%) – There is no textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved. Attendance counts.

2. 5-slide Reflective PowerPoint file with pictures presentation and posted to Blackboard (**Jan 29**)  
AND **750-word Snapshot Abstract submitted to (PJSL) and uploaded to BB**, (**February 10**)  

The Purdue Journal of Service-Learning [http://docs.lib.purdue.edu/pjsl/](http://docs.lib.purdue.edu/pjsl/)  
(10%)
3. Complete the Post-experience Intercultural Attitudes, Skills, and Knowledge Short Scale and the Plus (A.S.K.S2+) and Civic Engagement Short Scale Plus (C.E.S2+) assessments (5%)

4. Design Reviews – week 8 and week 14 (10%)
   Presentation to reviewers external to the team to provide feedback on the design and the process.

5. Lessons from Haiti Seminar/Callout for 2016-17 on March 1 (5%)  
   All Haiti students will prepare, promote, and present a Lessons from Haiti Seminar during week 8 of our class to raise awareness about issues in Haiti, to promote opportunities to work in Haiti in the future, and potentially be a fundraiser for selected projects.

Assessments:
- Team Project Documentation uploaded to Dropbox 30
- Student Room Team Reflective Article 10
- Student Room Team Promotion Video 20
- Attendance 05
- Individual 5-pptx Reflection Presentation 05
- 750-word Snapshot Abstract submitted to PJSL 10
- Post-experience A.S.K.S2+ and C.E.S2+ assessments 05
- Haiti Team Presentations/Design Reviews – week 8 and 14 10
- Lessons from Haiti Seminar – March 2 05

I. Prerequisites; YDAE 43110 International Engagement Methods

J. Course Instructor and Contact Information

Course Leadership: Mark Russell, YDAE, 765-494-8423, mrussell@purdue.edu
Teaching Assistants: YDAE Graduate Students

K. Reading List (include course text)

There is no textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved

Example of Course Syllabus

Proposed YDAE 43120
Evaluating International Engagement Methods
Post Service-Learning laboratory Class
Course Description: cr. 1; designed for students who have just returned from the Engagement Methods for Int’ Food Security course or have previous experience working with our partners. In order 1) fully comprehend the impact of the experience and 2) foster true long-term relationships with and service to our partners, it is required to work on the our projects when we return. Matt McGregor, Former Exec. Dir. of Timmy Global Health told us that “It’s not really about the trip”, to it is essential that we accomplish:
1. Closure of trip experiences with partners and contacts – thank you’s and complete follow-up,
2. Reflection of Purdue student experiences and personal goals/follow-up actions
3. Promotion of food insecurity realities and opportunities for support
4. Planning, recommendations, and promotion of future service learning courses.

Co- or Pre-requisite: YDAE 43110 International Engagement Methods

Course Leadership: Mark Russell, YDAE, 765-494-8423, mruell@purdue.edu
Teaching Assistants: YDAE Graduate Students

Time and Room: Wednesdays, 3:30-5:20, REC 108; then team breakout locations

Partners:
- Université Anténor Firmin (UNAF) in Cap-Haitien; Gedeon Eugene, President, unafcap@yahoo.fr
  Lead science teacher – Jodbelem Chery, jodbelemchery490@yahoo.com
- Centre technique d’entreprenariat agricole et de Développement (CTEAD);
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Course Learning Objectives: through this course series, students will prepare for and participate in cultural learning experiences which cause them to:
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- demonstrate the ability to communicate persuasively and while considering audience and purpose in a different cultural setting;
- assess the partners’ needs, plan, present, and assess educational programs in Haiti, and
- demonstrate the ability to work constructively as part of a bi-national problem-solving team.
### Course Schedule:

<table>
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<tr>
<th>DATE/week</th>
<th>Wednesday Labs</th>
<th>Assignments</th>
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</table>
| January 11 1 | Welcome and icebreaker activity  
Service Learning = Experiential Learning + Project Design; - All Six Project Updates  
What commitments to partners? |
| January 18 2 | Determine teams for this semester  
Decision Matrix & project Timelines  
Work in teams and promote Haiti 2016-17 | Jan 26 – COA SA Fair 3:00-5:00  
LILY Lobby w/ 2016-17 flyer |
| January 25 3 | Individual 5-PPTx slide reflection  
Prepare for Haiti seminar and Work in teams | Individual PPTx reflection – Jan. 29th uploaded |
| February 1 4 | Individual 5-PPTx slide reflection  
Prepare for Lessons from Haiti seminar and Work in teams | Promised deliverables shipped to partners |
| February 8 5 | Prepare for Lessons from Haiti seminar and Work in teams | Snapshot Abstract submitted to PJS |
| February 15 6 | Prepare for Lessons from Haiti seminar and Work in teams | Project Documentation uploaded  
Post-experience IDI assessment completed |
| February 22 7 | Rehearsal of Mid-Semester Review and seminar and seminar planning | |
| March 1 8 | **3:30 Mid-Semester Review  
6:00 Lessons from Haiti Seminar** | WSLR 116 |
| March 8 9 | Debrief on Design Review feedback  
Work in teams | **A.S.K.S²** and **C.E.S²** assessments  
Haiti Team Semester Deliverables |
| March 15 10 | Spring Break | |
| March 12 11 | Work in teams | Midterm peer and project evaluation feedback |
| April 5 12 | Work in teams | Student Team Reflective Article  
Midterm peer and project evaluation feedback |
| April 12 13 | Work in teams | |
| April 19 14 | **Final Design Review** | Final Reflection Prompt |
| April 26 15 | Debrief on feedback and fall planning  
Work in teams | Project Documentation uploaded Final Reflection and Evaluation Form due |

### Specific Team Leadership Possibilities

|---------------------|---------------------------|-------------------|

### Grading/Assignments for all students:

**Team Assessments**

18. **Team Project Documentation uploaded to your team Dropbox by January 15** (30%)

Update your project revision of history and status of project, the project charter, project timeline, and draft timeline for next semester and relationship to the overall partner relationship and goals.
Include in your Word docx with links and/or references to resources and data including responses to these prompts:

a. Describe participants in or related to your team projects in detail with pictures, descriptions, names, emails, and goals. Get actual measurements of resources. Include pictures of facilities inside and outside.

b. Document at least 3 potential “champions” of people who might be able to run the projects when you are done.

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c. Describe the current facilities/equipment/environments that you observed when you were interacting with your participants, their businesses and their families. Include GPS locations and also the locations where materials and supplies can be purchased.

d. What are the real strengths/opportunities/resources/assets present with this industry/community situation that can be used to improve their livelihoods?

e. How were your observations different than you have learned in class? What are the barriers/threats hindering improved livelihoods?

f. What exactly did your team end up presenting and how did you present? What worked well – what didn’t?

g. What were the reactions of the participants to your workshop/presentation/ideas? What might you have changed? Why? Include the impact assessment/survey results.

h. What service projects do you suggest in addition to the field demonstrations and symposium presentations for the next Purdue visit? Why?

i. What new information about our partners and the people they serve did you learn that changes/supports our efforts in the future?

j. What short term steps/projects do you recommend for your team next year to build long-term trusting relationships? What projects should be continued/discontinued and why?

19. **Student Room Team Reflective Article** – a 3,000-word essay with five color images w/captions by March 30 which explains one of the following topics: 1) Agr-Symposium itself, 2) the partners and their goals, 3) UNAF facilities, sizes, and purposes, 4) Cap Haitian and community, and 5) us in the Haitian culture to instructors and submitted to The Purdue Journal of Service-Learning (PJSL), http://docs.lib.purdue.edu/pjsl/ (10%)

20. **Student Room Team Promotion Video** on one of the following topics: 1) Agr-Symposium itself, 2) the partners and their goals, 3) UNAF facilities, sizes, and purposes, 4) Cap Haitian and community, and 5) us in the Haitian culture to instructors. Your 3-4 minute video will be edited and submitted to IPIA by April 13. (20%)

**Individual Professional Preparation & Participation** 40%

6. Attendance (5%) – There is no textbook or source of information. The instructors and each of you will be sharing information from many sources. The only way that you can learn and contribute to this environment is to be present and actively involved. Attendance counts.

7. 5-slide Reflective PowerPoint file with pictures presentation and posted to Blackboard (Jan 29) (5%) AND a 750-word Snapshot Abstract submitted to (PJSL) and uploaded to BB, (February 10) The Purdue Journal of Service-Learning http://docs.lib.purdue.edu/pjsl/ (10%)

Both of these documents must address the following items:

h. How has your opinion/impression of Haiti/Cap Haitien changed as a result of the trip?

i. How did the community engagement/service projects contribute to the challenges and goals of our hosts? Briefly describe the experience(s) being discussed.
j. How did this service learning experience affect permanent awareness, attitudes, or behavior change in you?

k. What three transferable skills did you develop/strengthen while preparing and working in Haiti? Give specific examples/situations of how this occurred

l. How will these skills/attributes benefit your career and life effectiveness?

m. Oh, I see you went to Haiti for a Study Abroad class over Winterbreak.
n. Tell me about that experience. How was it? (2-3 sentences only)

8. Complete the Post-experience Intercultural Attitudes, Skills, and Knowledge Short Scale and the Plus (A.S.K.S2+) and Civic Engagement Short Scale Plus (C.E.S2+) assessments (5%)

9. Design Reviews – week 8 and week 14 (10%)  
   Presentation to reviewers external to the team to provide feedback on the design and the process.

10. Lessons from Haiti Seminar/Callout for 2016-17 on March 1 (5%)  
    All Haiti students will prepare, promote, and present a Lessons from Haiti Seminar during week 8 of our class to raise awareness about issues in Haiti, to promote opportunities to work in Haiti in the future, and potentially be a fundraiser for selected projects.

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750-word Snapshot Abstract submitted to PJS 10
Post-experience A.S.K.S2+ and C.E.S2+ assessments 05
Haiti Team Presentations/Design Reviews – week 8 and 14 10
Lessons from Haiti Seminar – March 2 05

Grading
Using the above assignments, your grade will be based on the following grading scale:
A 90-100%; B 80-89%; C 70-79%; D 60-69%; F 0-59%

Academic Misconduct: Academic misconduct of any kind will not be tolerated. Assignments with evidence of academic misconduct will receive zero credit and the student will be reported to the Dean of Student Affairs. Information on Purdue policies with regard to academic misconduct can be found at [http://www.purdue.edu/studentregulations/student_conduct/regulations.html](http://www.purdue.edu/studentregulations/student_conduct/regulations.html)

Students with Disabilities: If you have a documented academic disability, please notify the instructor at the beginning of the semester to ensure appropriate accommodations can be made during lectures and exams. All communication between students and the instructor will be strictly confidential.

Nondiscrimination: Purdue University is committed to maintaining a community which recognizes and values the inherent worth and dignity of every person; fosters tolerance, sensitivity, understanding, and mutual respect among its members; and encourages each individual to strive to reach his or her own potential. In pursuit of its goal of academic excellence, the University seeks to develop and nurture
diversity. The University believes that diversity enriches campus life. Purdue University prohibits
discrimination against any member of the University community on the basis of race, religion, color, sex,
age, national origin or ancestry, marital status, parental status, sexual orientation, disability, or status as a
veteran. The University will conduct its programs, services and activities as set forth in

YDAE 54500
Teaching STEM through Agriculture, Food and Natural Resources
Detailed Graduate Course Proposal for Academic Review

Note: The detailed course proposal is intended for academic review by the appropriate area committee of
the Graduate Council. It supplements the Form 40G that is intended for administrative review of the
Graduate School and Registrar.

To: Purdue University Graduate Council
From: Faculty Member: Hui-Hui Wang
       Department:  YDAE
       Campus: PWL
Date: November 1, 2016
Subject: Proposal for New Graduate Course

Contact for information if questions arise:
        Name: Hui-Hui Wang
        Phone: 4-6897
        Email: huiwang@Purdue.edu
        Address: 615 W. State Street, West Lafayette, IN, 47907

Course Number: YDAE 545000
Course Title: Teaching STEM through Agriculture, Food and Natural Resources
Short Title: Teaching STEM through AFNR

Course Description:

The course focuses on the background and history of STEM movement and agricultural
education, contemporary models, strategies, and justification for incorporation of science,
technology, engineering and mathematics (STEM) concepts and practices into K-12 formal and
non-formal agricultural education programs. Consider and develop the best practices for STEM
teaching and learning and enhancement of STEM content in agriculture, food and natural
resources context. The goal of the course is to help students develop knowledge about STEM integration and equip them with teaching knowledge and skills for designing K-12 formal or non-formal lesson plans by using agriculture, food and natural resources as context. Students will learn strategies that promote engagement in STEM integrated activities in agricultural education. At the end of the course, students should be able to design and implement research-based STEM integrated lesson plans and assessment plans.

A. Justification for the Course

Justification of the need for the course

- This course focuses on developing professional skills for graduate students in the YDAE Department, as it provides knowledge and information on developing teaching and writing lesson plan skills. In addition, this course is valuable to students in other departments, such as students in other STEM fields, who are interested in education and STEM integration. In order to prepare YDAE graduate students and other students in STEM majors to become qualified future STEM educators, there is a clear need for a course to help students develop knowledge about STEM integration and equip them with teaching knowledge and skills for designing K-12 formal or non-formal lesson plans.

Justification that course will be taught at a graduate level

- This course is designed for graduate students, although upper level undergraduate students may enroll. The course requires extension reading of scholarly articles outside of class time, and multiple writing assignments, such as reflection paper, lesson plan, assessment plan, post-teaching self-evaluation paper, lesson plan rationale, and a manuscript that can be used to disseminate the integrated STEM lesson to professional audiences. The course requires students to synthesize the readings, course materials, and discussion to answer questions. In addition, the course requires students teach the lesson plans that they develop in this course to local YMCA youth program.

Justification of the demand for the course

- Anticipated enrollment
  - Undergraduate 2
  - Graduate 10

Justification for online delivery

No online delivery components for the course.

B. Learning Outcomes and Methods of Assessment

At the end of this course, students should be able to:
1. Analyze integrated models of STEM learning, and justify how a selected model informs best practices for science and agriculture, food, and/or natural resources teaching and learning.

2. Evaluate current national and state standards that help design lesson plans in nonformal, and formal educational contexts.

3. Develop lesson plans by using agriculture, food, and/or natural resources as context to teach STEM content and concepts.

4. Describe life and 21st century skills that are relevant in agriculture, food, and/or natural resources contexts and demonstrate how these skills can be integrated into lesson plans.

5. Create an assessment plan to evaluate learning outcomes.

6. Apply learner-centered teaching strategies, such as inquiry-based learning, to teach the lesson plans.

7. Create a manuscript that can be used to disseminate the integrated STEM lesson to professional audiences.

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Assessment Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze integrated models of STEM learning, and justify how a selected model informs best practices for science and agriculture, food, and/or natural resources teaching and learning.</td>
<td>• Students’ reflection paper, lesson plans, and lesson plan rationale will be used to assess this outcome.</td>
</tr>
<tr>
<td>Evaluate current national and state standards that help design lesson plans in nonformal, and formal educational contexts.</td>
<td>• Students’ lesson plans will be used to assess this outcome.</td>
</tr>
<tr>
<td>Develop lesson plans by using agriculture, food, and/or natural resources as context to teach STEM content and concepts.</td>
<td>• Students’ lesson plans will be used to assess this outcome.</td>
</tr>
<tr>
<td>Describe life and 21st century skills that are relevant in agriculture, food, and/or natural resources contexts and demonstrate how these skills can be integrated into lesson plans.</td>
<td>• Students’ lesson plans will be used to assess this outcome.</td>
</tr>
<tr>
<td>Create an assessment plan to evaluate learning outcomes.</td>
<td>• Students’ assessment plan will be used to assess this outcome.</td>
</tr>
<tr>
<td>Apply learner-centered teaching strategies, such as inquiry-based learning, to teach the lesson plans.</td>
<td>• Students’ reflection paper, post-teaching, and self-evaluation paper will be used to assess this outcome.</td>
</tr>
<tr>
<td>Create a manuscript that can be used to disseminate the integrated STEM lesson to professional audiences.</td>
<td>• Student’s draft manuscript for dissemination will be used to assess this outcome.</td>
</tr>
</tbody>
</table>

- Students are expected to complete readings and actively participate in class activities (~20%).
This assignment includes reading assigned articles and participating in course discussions, and writing reflection papers.

- Develop a STEM integrated lesson plan by using agriculture, food, and/or natural resources as context (30%). This assignment includes developing STEM integrated lesson plan outline and 3 lesson plans (45-60 minutes), and identify teaching strategies that are research-based, and articulate supporting rationale of the STEM integrated lesson plans.

- Teach and implement STEM integrated lesson plan to K-12 audiences by using agriculture, food, and/or natural resources as context (~35%). This assignment includes developing both summative and formative assessment.

- Develop a draft manuscript for dissemination (~15%). This assignment includes developing a draft of a manuscript, which describes the design and implementation of a STEM integrated lesson plan/activity by using agriculture, food, and/or natural resources as context.

**Final Grading Criteria**

Describing the criteria that will be used to assess students and how the final grade will be determined. Add and delete rows as needed.

<table>
<thead>
<tr>
<th>Assessment Methods (should match method types in the previous table)</th>
<th>Weight Toward Final Course Grade</th>
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<tbody>
<tr>
<td>Exams and Quizzes</td>
<td>0</td>
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<tr>
<td>Papers and Projects</td>
<td>80</td>
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<td>Homework</td>
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<td>Laboratory Exercises</td>
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<tr>
<td>Class Participation</td>
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**Methods of Instruction**

<table>
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<tr>
<th>Class Hrs/Week</th>
<th>Method of Instruction</th>
<th>Contribution to Outcomes</th>
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<tbody>
<tr>
<td>3</td>
<td>Lecture</td>
<td>Teach the content knowledge of STEM integration, activities, and reading discussion. In addition, students work as teams to do hands-on activities to apply concepts and present the STEM integrated lessons that they have developed. Students also will observe, reflect, discuss and practice their teaching skills with a YMCA youth program.</td>
</tr>
</tbody>
</table>
C. Prerequisite(s)

If no prerequisites, explain rationale:

- No prerequisites. This course is designed for students early in their graduate program, and as a foundational course does not have prerequisites. We are also hopeful that not having prerequisites will enable students from other departments to more easily enroll in, and take this course, if they are interested in education.

D. Course Instructor(s)

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>School, dept., or center</th>
<th>Graduate Faculty or expected date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hui-Hui Wang</td>
<td>Assistant professor</td>
<td>YDAE</td>
<td>YES</td>
</tr>
<tr>
<td>Neil Knobloch</td>
<td>Associate professor</td>
<td>YDAE</td>
<td>YES</td>
</tr>
</tbody>
</table>

E. Course Schedule or Outline

Schedule Format
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic(s)</th>
<th>Activity (optional)</th>
</tr>
</thead>
</table>
| 1    | • Course Introduction & Syllabus  
      • Who Are We? Agricultural Education as a Field/Content  
      • Formal, Non-formal, and Informal Learning |  |
| 2    | • Why STEM is Important: Introduction to STEM Movement  
      • What is Your View of STEM Integration? |  |
| 3    | • Science and Engineering  
      • Relevance of STEM to Agricultural Education: Why Agriculture? |  |
| 4    | • Technology and Mathematics  
      • Approaches to Integrated STEM |  |
| 5    | • Agriculture Standards and STEM Standards (including content and life skills)  
      • Meaningfully Integrated STEM Learning  
      • Developing a Big Idea of STEM Integrated Lesson Plan (outline) |  |
| 6    | • How Students Learn?  
      • Backward Design (Developing a lesson plan and learning objectives)  
      • First micro teaching experience |  |
| 7    | • Learner-Centered Teaching Model  
      • The 5E Model  
      • Engineering Design |  |
| 8    | • Work on Your Lesson Plans |  |
| 9    | • Introduction to Assessment Tool and Develop a Rubric  
      • YMCA experience: Non-formal discussion |  |
| 10   | • Critique Existing STEM Lesson Plans  
      • Submit a Manuscript to Science & Children or Science Scope  
      • Classroom Management and Engaging Students, and Safety Plans |  |
| 11   | • Microteaching  
      • Peer Review Lesson Plan/Activity, and Assessment Plans |  |
<p>| 12   | • Teaching at YMCA |  |
| 13   | • Informal Learning (Fieldtrip to Columbian Park Zoo) |  |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic(s)</th>
<th>Activity (optional)</th>
</tr>
</thead>
</table>
| 14   | • The Challenge of STEM Education  
      • Preparing Manuscripts |        |
| 15   | • Submit Assignments and reflection |        |
| 16   | Not applicable |        |

**F. Reading List (including course text)**

**Primary Reading List**


(2) Other selected articles & resource will be available via BlackBoard:

[click here and insert full scholarly citation]

**G. Library Resources**

<table>
<thead>
<tr>
<th>Name of journal, proceedings, book, video, or other acquisition</th>
<th>Already in Libraries?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson essentials, grades 3-8: Integrating science, technology, engineering, and mathematics</td>
<td>Yes</td>
</tr>
<tr>
<td>STEM integration in K-12 Education.</td>
<td>Yes</td>
</tr>
</tbody>
</table>
H. Course Syllabus (now required)

YDAE 545
TEACHING STEM THROUGH AGRICULTURE, FOOD AND NATURAL RESOURCES
CRN: 14935

Wednesday, 8:30-11:20, PFEN 103
3 cr. Spring, 2017

Instructors
Dr. Hui-Hui Wang                  Phone: 494-6897;        Email: huiwang@purdue.edu
Office: 203 AGAD Office Hours: By appointment

Dr. Neil Knobloch Phone: 494-8439;        Email: nknobloc@purdue.edu
Office: 225 AGAD Office Hours: By appointment

Description of Course
The course focuses on the background and history of STEM movement and agricultural education, contemporary models, strategies, and justification for incorporation of science, technology, engineering and mathematics (STEM) concepts and practices into K-12 formal and non-formal agricultural education programs. Consider and develop the best practices for STEM teaching and learning and enhancement of STEM content in agriculture, food and natural resources context. The goal of the course is to help students develop knowledge about STEM integration and equip them with teaching knowledge and skills for designing K-12 formal or non-formal lesson plans by using agriculture, food and natural resources as context. Students will learn strategies that promote engagement in STEM integrated activities in agricultural education. At the end of the course, students should be able to design and implement research-based STEM integrated lesson plans and assessment plans.

Course Goals
At the end of this course, students should be able to:
1. Analyze integrated models of STEM learning, and justify how a selected model informs best practices for science and agriculture, food, and/or natural resources teaching and learning.
2. Evaluate current national and state standards that help design lesson plans in nonformal, and formal educational contexts.
3. Develop lesson plans by using agriculture, food, and/or natural resources as context to teach STEM content and concepts.
4. Describe life and 21st century skills that are relevant in agriculture, food, and/or natural resources contexts and demonstrate how these skills can be integrated into lesson plans.
5. Create an assessment plan to evaluate learning outcomes.
6. Apply learner-centered teaching strategies, such as inquiry-based learning, to teach the lesson plans.
7. Create a manuscript that can be used to disseminate the integrated STEM lesson to professional audiences.

Course Requirements
(1) BlackBoard course site - http://www.itap.purdue.edu/tlt/blackboard/index.cfm
(3) Selected Articles & Resources (will be available via BlackBoard). Examples are:

Course Assignments
Students are expected to complete readings and actively participate in class activities. See evaluation checklists for course assignment instructions. Written assignments should be double-spaced, 12 point font, 1 inch margins. Students will largely be citing in the format of APA style.

Course grades are based on the following:

- Complete assigned readings and participate in course activities (~20 %)
  o Read assigned articles and participate in course discussions (~10%)
  o Write reflection papers (~10 %)
- Develop a STEM integrated lesson plan by using agriculture, food, and/or natural resources as context (~30%)
  o Develop STEM integrated lesson plan outline (~5%)
  o Develop STEM integrated 3 lesson plans (45-60 minutes) and identify teaching strategies that are research-based (~15%)
  o Articulate supporting rationale of the STEM integrated lesson plan (~10%)
- Teach and implement STEM integrated lesson plan to K-12 audiences by using
agriculture, food, and/or natural resources as context (~35%)
  o Summative assessment
    1. Develop or modify an assessment tool as pre-and-posttest to evaluate
       knowledge outcomes of the lesson plan (~10%)
    2. A rubric (~5%)
  o Formative assessment
    1. Students’ worksheet, observation checklist, questions that instructors will
       ask, or a feedback activity to monitor understanding during the lesson
       (~5%)
    o Conduct a peer observation (~5%)
    o Self-evaluate one’s teaching using a rubric provided and write at least one page
       self-reflection on the teaching experience (~10%)
  • Create a draft manuscript for dissemination (~15 %)
    o Develop a draft of a manuscript, which describes the design and implementation
       of a STEM integrated lesson plan/activity by using agriculture, food, and/or
       natural resources as context

COURSE SYLLABUS

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>• Course Introduction &amp; Syllabus</td>
<td>• Read assigned articles</td>
</tr>
<tr>
<td>(01/14)</td>
<td>• Who Are We? Agricultural Education as a Field/Content</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Formal, Non-formal, and Informal Learning</td>
<td></td>
</tr>
<tr>
<td>Week 2</td>
<td>• Why STEM is Important: Introduction to STEM Movement</td>
<td>• Reading assigned articles</td>
</tr>
<tr>
<td>(01/21)</td>
<td>• What is Your View of STEM Integration?</td>
<td>• Reflection paper</td>
</tr>
<tr>
<td>Week 3</td>
<td>• Science and Engineering</td>
<td>• Read assigned articles</td>
</tr>
<tr>
<td>(01/28)</td>
<td>• Relevance of STEM to Agricultural Education: Why Agriculture?</td>
<td></td>
</tr>
<tr>
<td>Week 4</td>
<td>• Technology and Mathematics</td>
<td>• Read assigned articles</td>
</tr>
<tr>
<td>(02/04)</td>
<td>• Approaches to Integrated STEM</td>
<td>• Select partners to develop STEM integrated lesson plans</td>
</tr>
<tr>
<td>Week 5</td>
<td>• Agriculture Standards and STEM Standards (including content and life skills)</td>
<td>• Read assigned articles</td>
</tr>
<tr>
<td>(02/11)</td>
<td>• Meaningfully Integrated STEM Learning</td>
<td>• Reflection paper</td>
</tr>
<tr>
<td>Week 6</td>
<td>• How Students Learn?</td>
<td>• Read assigned articles</td>
</tr>
<tr>
<td>(02/18)</td>
<td>• Backward Design (Developing a lesson plan and learning objectives)</td>
<td>• Outline of your lesson plans</td>
</tr>
<tr>
<td></td>
<td>• First micro teaching experience</td>
<td></td>
</tr>
<tr>
<td>Week 7</td>
<td>• Learner-Centered Teaching Model</td>
<td>• Read assigned articles</td>
</tr>
<tr>
<td>(02/25)</td>
<td>• The 5E Model</td>
<td>• Reflection paper</td>
</tr>
<tr>
<td></td>
<td>• Engineering Design</td>
<td>• The first lesson plan</td>
</tr>
</tbody>
</table>
| Week 8  
(03/03) | • Work on Your Lesson Plans | • YMCA experience: Get to know your audiences. |
| Week 9  
(03/10) | • Introduction to Assessment Tool and Develop a Rubric  
• YMCA experience: Non-formal discussion | • Read assigned articles |
| Spring Break! | • Enjoy… | |
| Week 10  
(03/24) | • Critique Existing STEM Lesson Plans  
• Submit a Manuscript to *Science & Children* or *Science Scope*  
• Classroom Management and Engaging Students, and Safety Plans | • Reading assigned articles  
• Reflection paper |
| Week 11  
(03/31) | • Microteaching  
• Peer Review Lesson Plan/Activity, and Assessment Plans | • Assessment assignments (draft) |
| Week 12  
(04/07) | • No Class Session | • Teaching at YMCA Afterschool Program (April 4th to 15th) |
| Week 13  
(04/14) | • Informal Learning (Fieldtrip to Columbian Park Zoo) | • Reading assigned articles |
| Week 14  
(04/21) | • Reflection on Implementation  
• Example of an Integrated Lesson (Math & Agriculture) | • Reading assigned articles  
• Peer-observation  
• Self-evaluation paper after teaching |
| Week 15  
(04/28) | • The Challenge of STEM Education  
• Preparing Manuscripts | • Reflection paper  
• STEM integrated lesson plans, assessment plan and rubric  
• Rationale of the STEM integrated lesson plans that you designed |
| Week 16  
(05/05) | • Submit Assignments for Final Exam  
Week (No Class Session) | • Reflection paper  
• Manuscript for publication |

**Grading Scale**

*Grades will be assigned on a standard scale:*

- 97-100% A+
- 93-96% A
- 90-92% A-
- 87-89% B+
- 83-86% B
Curriculum and Student Relations Committee
Proposed Curricular Changes

Update to Core Curriculum Lists  (For Information Only)

Previously, the Agricultural Faculty authorized the Curriculum and Student Relations Committee to make adjustments to the lists of courses that may fulfill core curriculum requirements in undergraduate plans of study and to report changes to the total faculty. The Curriculum and Student Relations Committee has adopted the following modifications to the core curriculum lists.

Additional Mathematics and/or Sciences

Additions
(3) AGRY 12500 – (Environmental Science and Conservation)
(2) ENTM 10200 – (The Practice of Science)
(4) ENTM 25300 – (Insect Physiology and Biochemistry)
(3) ENTM 30100 – (Experimentation & Analysis)
(3) ENTM 31200 – (Insect Chemical Ecology)
(3) ENTM 32810 – (Practical Molecular Biology)
(2) ENTM 35300 – (Insecticides & Environment)
(2) ENTM 41000 – (Applied Insect Biology)
(1) ENTM 41001 – (Insects of Urban Landscapes)
(1) ENTM 41002 – (Insects of Agricultural Crops)
(3) FNR 12500 – (Environmental Science and Conservation)
(3) NRES 12500 – (Environmental Science and Conservation)

Deletions
(3) AGRY 29000 – (Introduction to Environmental Science)
(3) NRES 29000 – (Introduction to Environmental Science)

Additional Written and/or Oral Communication

Additions
(3) EDPS 31500 – (Collaborative Leadership: Listening)
(3) ENTM 30100 – (Scientific and Technical Communication)

Capstone

Additions
(2-4) ENTM 49310 – (Insect Biology Capstone Experience)
(1) HORT 42700 – (Horticulture Capstone)
Social Science and Humanities

Additions
(3) AGRY 12300 – (Genetics and Society)

Foreign Language Update
Old
Foreign Language (language or culture and literature) may be a humanities selection. Any Foreign Language course may be an international understanding selection. A minimum of 6 credits of a foreign language must be earned to be included in a plan of study. Cultures courses, taught in English, can be used with 3 credits minimum and are listed.

New
Foreign Language (language or culture and literature) may be a humanities selection. Any Foreign Language course may be an international understanding selection. A minimum of 3 credits of a foreign language must be earned to be included in a plan of study.

Program Name Change
Old – Pathway to Purdue
New – Pathway to Purdue Agriculture
## College of Agriculture
### 2016 December Graduation Candidate Roster
#### As of November 8, 2016

Subject to the approval of the Agricultural Faculty, the following graduation candidates who complete degree requirements during the current semester will be recommended to the Board of Trustees to receive their degrees as of December 18, 2016. Also, the Dean of Agriculture, or his designee shall be authorized to act for the faculty regarding the certification of qualified candidates.

<table>
<thead>
<tr>
<th>College</th>
<th>Name</th>
<th>Degree</th>
<th>Major</th>
<th>Minor1</th>
<th>Minor2</th>
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<tbody>
<tr>
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<td>Abercrombie, Sarah A.</td>
<td>CERT</td>
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<tr>
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<td>WLFS</td>
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<td>A</td>
<td>Boganwright, Tyler H.</td>
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<td>Boganwright, Tyler H.</td>
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**Bachelor of Science in Agricultural Engineering**

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**Bachelor of Science in Biological Engineering**

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**Bachelor of Science in Forestry**

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