Entomology 2015
Biol 406 (4 credits)

Instructor: Derek S. Sikes
Museum
474-6278
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TA: Logan Mullen
Museum, Ent Lab
507-475-0732
474-6279 (lab)
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Website: https://classes.uaf.edu/webapps/login (Blackboard)
Office Hours: Wednesdays 12-1, Museum
(or by appt.)

Lectures in Museum 151, Tuesday & Thursday 9:45-11:15 AM

Lab: in Murie 302, Thursday, 2:00-5:00 pm


Additional lab reading materials will be provided to you; Recommended:

Course description: Biology of insects and related arthropods, with emphasis on evolution, ecology, behavior, biodiversity, morphology, and systematics. Lab emphasizes identification and collection.

Course prerequisites: BIOL F115X, F116X, F271 or by permission of instructor
Meets: Natural science degree requirement with lab.
Note: Offered Alternate Fall.

Goals of the Course: This course will serve as an introduction to entomology and provide a solid background for students who wish to pursue in-depth entomological studies in employment or graduate school. It will introduce students to the exciting field of insect biology and encourage life-long learning of entomology.

Specific Objectives: Students will:
1. Learn all the major groups of arthropods and their characteristics.
2. Be able to sight identify the orders of insects and some common families.
3. Recognize and be able to label the body parts of different insects.
4. Explain ecological roles of common types of insects.
5. Collect and process (sort, mount, database & label) non-marine arthropods.
6. Explain the importance of insects to human affairs.
Course instruction will consist of 1.5h lectures twice a week, a weekly 3h lab, textbook and lab readings, and classroom discussion. Expect to spend 6h per week preparing and reading outside of class (see http://www.uaf.edu/catalog/catalog_10-11/courses/descriptions.html).

Course policies: Material presented in all lectures and labs scheduled during normal class periods is fair game on any quiz or exam. Participation in lecture and lab discussions will count towards your final grade (see below). Lectures and lab will begin immediately upon the hour of scheduled meeting times. Plagiarism and other forms of cheating – including falsifying data – will result in an automatic "F" in the class. SAFEASSIGN via the Blackboard website will be used to check for plagiarism in submitted work. The student's advisor will be notified of this grade assignment and the student will not be allowed to drop the course. Late work: three deadlines exist: draft term project, collection and final term project. Each day past the deadline will cost 5% of the final grade. No electronic devices are allowed in lecture (lab and readings discussion is ok) without special permission (see https://medium.com/@cshirky/why-i-just-asked-my-students-to-put-their-laptops-away-7f5f7c50f368).

Course webpage: Access the course webpage via Blackboard at https://classes.uaf.edu/webapps/login Double-check that your current & used email is listed or you risk missing important announcements. The syllabus, supplemental reading, lecture notes, etc. are available at this website. If your computer is not working, use the IAB computer resource lab in 303 Irving I, computers in the library, or other UAF computer labs.

Communication: The best way to reach me outside of class is via email. However, do not use email to ask questions about course content that you could ask before or after class, or during office hours. Email is for quick communications about scheduling or other brief items only.

Please turn off or silence cell phones during class and lab.

Laboratory Work: You are required to attend the laboratory portion of this course. Laboratory work is designed to give you a hands-on learning opportunity into the world of insects. This will involve dissection, familiarization with form and structure, use of scientific keys, and slide viewing. Relevant keys to the identification of insects and other useful books and materials will be available. Open lab hours will be posted in lab. Students are encouraged to view material before exams.

The laboratory section of this course will focus on the traits used to recognize different groups of insects (including, but not limited to, the orders and families represented in the teaching collection especially those found in Alaska).

Laboratory instruction will include group discussion, small group work, hands-on activities, and analysis of anatomical features. Students will be expected to understand and use identification keys. A firm grasp of taxonomic and systematic nomenclature will be critical to success in this course.
**Be Advised:** Indifferent or malicious treatment of museum and/or teaching specimens will not be tolerated. Some specimens will be displayed for visual inspection only. In addition, a variety of chemicals have been used in lab as preservatives, therefore *no food or drink will be allowed in the lab.*

-------------- Other ---------------

**Disabilities Services:** The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 Whit., 474-7043) to provide reasonable accommodation to students with disabilities.

**Missed lecture / lab policy:** In special circumstances you will allowed to make up missed work. Unexcused absences from lab or lecture will reduce participation grade. Exams and lab practicals can only be missed if (A) you suffer from a physician-certified illness (need to show me a note from your physician), or (B) are traveling on University or military business, or (C) have another serious, documentable calamity. Notify me ahead of time if possible if you are going to miss an exam, and be prepared to document the calamity. If an exam is missed (for a justifiable and documented reason) you will need to make an appointment with me to complete a make-up exam.

-------------- Additional course information ---------------

This class requires extensive memorization of taxonomic names, and anatomical features, (in addition to lecture and reading material). This can seem daunting, but it is nonetheless necessary to gain an appreciation and understanding of arthropod diversity and evolution.

**Handouts** and other materials will be made available on Blackboard.

**Extracurricular opportunities:** You are encouraged to consider volunteer work in the Entomology department of the University of Alaska Museum (during or after the course ends). Your training in class can provide you an excellent start on assisting with various research goals of the Museum (and is both fun & looks good on your Resume!)

**Laboratory Project:** (Collection) Each student is expected to create and curate a small insect collection. *See grading notes with details on collection requirements at end of syllabus.* Your collection will be submitted at the end of the semester for a grade, and the specimens will be incorporated into the University of Alaska Museum or the teaching collection.

**Laboratory Quizzes:** Each lab session will begin *on time* with a short quiz that will be graded. If you are late or miss a lab you will not be able to make up the quiz and will receive 0 points for that quiz, however, your lowest quiz grade will automatically be dropped.
Laboratory Practicals: Questions will be asked based on specimens at multiple stations (with multiple questions/station). These will be partially open-note/open book exams (a closed-book section and an open-book section). The closed book section will require you to be able to identify orders or higher ranks on-sight.

Participation Grade: 10% of your grade is based on participation. This will entail attending all labs, and by participating by asking questions in lecture and lab.

Readings: Complete readings before class. Chapters in the text are intended to augment lecture material but will not be specifically discussed in class (with a few possible exceptions). Supplemental readings from the primary literature will be made available, which will be discussed in class at the start of Thursday lecture and form material for exam questions. A student at random will be selected to start each discussion (so be sure to come prepared!) and each student will submit by email prior to class on Thursday, two questions related to each of the readings, which will be potentially used as test questions. If you skip a class or I call on you to present and you are not prepared this will cost you 1/5th of your participation grade.

Lecture exams: Based on class notes and readings. Cumulative but focused primarily on material not previously tested. Composed of definitions, short & long (essay) answer questions, with some matching or multiple choice. One or more bonus questions will be available. Open book/notes but no electronics.

Course Term Project/Presentation: You have options: Either write a 3-5 page research paper or do a project and write a 3-5 page report.

PAPER: You will write a 3-5 page paper and deliver a 5-10 minute powerpoint presentation on an entomological topic. The presentation will be worth 0.5% of your course grade. You will receive a separate handout with details on what is expected for this paper. Note that you will be required to turn in an almost-final draft to the instructor to be graded worth 0.5% of your course grade. The draft will allow me to catch mistakes that can be corrected before you turn in the final draft. If you fail to turn in a draft you will not only lose the 0.5% but also risk losing considerably more for errors that could have been easily caught & corrected in draft form. It would be SMART to treat the deadline for the draft as your final deadline – making your draft as close to finished as possible is your best chance at getting 100% on the paper.

Example Ideas: Lycaenidae & ants – review what is known about Alaskan species; Insect Biomass – review literature comparing insect to vertebrate biomass; Alaskan agriculture and insects; Insect overwintering strategies – review literature identifying which life stage overwinters for key Alaskan taxa; pollinators in Alaska & CCD; Climate Change and Insect Responses; human dwellings as habitats/ecosystems. You can also do a book report on a classic entomology book such as Evans "Life on a little known planet".

Be sure to clear your idea with me before starting! – It will NOT be acceptable to do a paper summarizing older literature that has already been summarized, similar to a chapter in your textbook. In most cases you will need to cover a topic that has never been summarized (hard to find these!) or cover publications that are recent enough they haven’t been summarized before.
You will be submitting your paper through SAFEASSIGN via BlackBoard, which checks for plagiarism.

PROJECT: Example ideas: Comparison of taxonomic diversity of different habitats – survey two habitats (eg. forest vs field) using a standardized method (eg sweep net for 10 minutes in each, pitfall traps, or pollinator cups). Collect and curate all arthropods being sure to label them with their habitat association. Identify specimens to order & family. Submit the collection separately from your main insect collection*, and a 3-5 page report of your findings, discuss the following questions: Is there a difference in diversity between habitats? Do certain families associate with certain habitats? What abiotic and biotic factors might explain these differences. (* note – although turned in separately, these specimens will count towards your main collection grade).

The above ideas can be modified to compare collection methods such as pollinator cup colors within a single habitat.

NOTE: for any field-based project you will need to move quickly to get the field work done within the first or second week of the semester, before it gets too cold!

**Evaluation:** The course grade will be based on the following:

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<tr>
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<th>Subject</th>
<th>Weight</th>
<th>Subject</th>
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<tr>
<td>1</td>
<td>Lab. quizzes</td>
<td>10%</td>
<td>Previous week’s lab / lecture</td>
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<td>2</td>
<td>Participation</td>
<td>10%</td>
<td>readings &amp; attendance</td>
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3  Lec. midterm exam          10%  Lecture & readings to exam
4  Lab. midterm pract.       10%  Lab id
5  Lec. term project check   0.5%  Term project ~complete
6  Collection               20%  See handout on collection
7  Lec. term project         9.5%  Term paper completed
8  Lec. term presentation    0.5%  Presentation
8  Lab. final practical      10%  Comprehensive
9  Lec. final exam           20%  Comprehensive

A +  96.7 - 100 %
A    93.4 - 96.6 %
A -  90  - 93.3 %
B +  86.7 - 89 %
B    83.4 - 86.6 %
B -  80  - 83.3 %
C +  76.7 - 79 %
C    73.4 - 76.6 %
C -  70  - 73.3 %
D +  66.7 - 69 %
D    63.4 - 66.6 %
D -  60  - 63.3 %
F    < 60%

EXTRA CREDIT:

1) The Entomology Department of the University of California at Davis has an archive of visiting seminar speakers’ talks online at:

http://entomology.ucdavis.edu/News/Webcast_Links/

For extra credit you can watch any two of these talks and prepare a brief but well written summary of each (no more than ½ page per talk). +2 % of final grade.

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<thead>
<tr>
<th>DATE</th>
<th>TOPICS</th>
<th>READINGS</th>
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<tr>
<td>3</td>
<td>lab.(1) Intro &amp; Profile UA Museum (meet in museum classroom)</td>
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<tr>
<td>8</td>
<td>lec.2. Biodiversity</td>
<td>Erwin 1982, Stork et al. 2015</td>
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<tr>
<td>10</td>
<td>lec.3. External &amp; internal Morphology</td>
<td>Ch 2, Ch 3</td>
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<tr>
<td>10</td>
<td>lab.(2) Collecting methods, External Morphology (Q on L1)</td>
<td>Ch 2, Ch17 (note Ch 17 = Ch 18 in 5th edition)</td>
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<td>15</td>
<td>lec.4. Morphology cont.</td>
<td>Ch 2, Ch 3</td>
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<td>17</td>
<td>lab.(3) Insect Internal Anatomy (Q on L2)</td>
<td>Ch 3, Ch17</td>
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<tr>
<td>24</td>
<td>lec.7. Arthropoda – Trilobita</td>
<td>Ch 7</td>
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<td>24</td>
<td>lab.(4) Keys, Arthropoda &amp; insect orders (Q on L3)</td>
<td>Ch 17</td>
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<td>29</td>
<td>lec.8. Arthropoda – Chelicera</td>
<td>Ch 7</td>
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<td>Oct 1</td>
<td>lec.9. Arthropoda – Myriapoda &amp; Crustacea</td>
<td>Ch 7</td>
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<tr>
<td>1</td>
<td>lab.(5) Basal orders &amp; families identification (QUIZ on orders)</td>
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<td>6</td>
<td>lec.10. Arthropoda – Hexapoda</td>
<td>Ch 7</td>
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<td>8</td>
<td>lec.11. Insecta – to Neoptera &amp; aquatics</td>
<td>Ch 7, 8, 10</td>
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<td>8</td>
<td>lab.(6) Polyneoptera families identification (Q on L5)</td>
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<td>13</td>
<td>lec.12. Polyneoptera</td>
<td>Ch 7</td>
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<td>15</td>
<td>lec.13. Paraneoptera</td>
<td>Ch 7</td>
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<td>15</td>
<td>lab.(7) Paraneoptera families identification (Q on L6)</td>
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<td>20</td>
<td>lec.14. Endopterygota</td>
<td>Ch 7</td>
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<td>22</td>
<td>lec.15. Endopterygota 2</td>
<td>Ch 7</td>
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<td>22</td>
<td>lab.(8) Minor Endopterygotes families id (Q on L7)</td>
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<td>27</td>
<td>lec.16. LECTURE MIDTERM EXAM</td>
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<td>29</td>
<td>lab.(9) Diptera families identification (Q on L8)</td>
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<td>Nov 3</td>
<td>lec.18. Forensic Entomology [email label template]</td>
<td>Ch 15.4</td>
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<td>5</td>
<td>lec.19. Feeding – Herbivory, pollination</td>
<td>Ch 11</td>
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<tr>
<td>5</td>
<td>lab.(10) LAB MIDTERM PRACTICAL</td>
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<td>10</td>
<td>lec.20. Feeding – Herbivory2</td>
<td>Ch 11</td>
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<tr>
<td>12</td>
<td>lec.21. Feeding – predation, parasitism</td>
<td>Ch 13</td>
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12  lab.(11) Lepidoptera families identification (no quiz)

17  lec.22. Defenses 1
19  lec.23. Defenses 2 [Project draft, graded worth %5]  Ch 14
19  lab.(12) Hym fam id, Collections inspection! (Q on L11)  Ch 14

24  lec.24. Social Insects 1

**********28 Nov – 1 Dec Thanksgiving Break**********

Dec  1  lec.25. Social Insects 2  Ch 12
     3  lec.26. Reproduction  Ch 5
     3  lab.(13) Coleoptera families identification (Q on L12)

8  lec.27. Medical Entomology  Ch 15
10  lec.28. Final lecture, left overs, review  Ch 6
10  lab.(14) LAB FINAL PRACTICAL (cumulative) Collections DUE
12  Presentation symposium at Sikes house. TERM PROJECT DUE

19  lec.29  LECTURE FINAL EXAM (cumulative) 8-10 AM

*****Expect to work on your insect collection during every lab*****

*****Expect to work at least 3h/wk on your insect collection outside of lab*****

Expect to spend 6h per week preparing and reading outside of class (see http://www.uaf.edu/catalog/catalog_10-11/courses/descriptions.html ). Half of those 6h should be devoted to your collection.

Since the average pinning rate is 55 specimens per hour if you spent only 1h per week pinning you should have at least 7 x 55 = 385 pinned specimens by the end of the course. DON'T procrastinate and save all these hours to the last few weeks of the course! You will regret it!
Grading of Student Collections

All specimens must have accurate locality data labels and be identified at least to order to be worth points.

1 point for each Arthropod CLASS identified (4 is max of prior years) ________

10 points for each ORDER identified (28 is max of prior years) ________

5 points for each FAMILY identified (93 is max of prior years) ________
3 points for each SUBFAMILY identified (only for Cicindelinae, Scolytinae, Formicinae, Myrmiciniae) ________

1 point for each specimen (except for the same species beyond specimen #5) (288 is max of prior years) but MUST be identified correctly to order ________

1 extra point for each 'pointed' specimen\(^1\) (or well-spread lepidopteran or odonate) (119 is max of prior years) but MUST be identified correctly to order ________

1 extra point for each specimen you collect yourself (211 is max of prior years) but MUST be identified correctly to order ________

10 points for curation /effort (assigned subjectively - neatness counts!) ________

NOTE: specimens in a vial count as one – group by lowest taxon x collecting event

******NOTE: misidentified specimens lose their ID points******

Common errors: labels facing wrong way, pointed specimen on wrong side of label (top of labels are always on the right, pointed pins go through the right side, not the middle of the label; misspelled identifications, missing labels).

Damaged specimens - some are better off in the garbage! If so, then they are worth zero points. (eg common house fly, headless) but a rare species missing a leg is ok.

Each student must fill out a page with the above counts and a list of all families, orders, etc. and each student will calculate their raw score based on (turn in with final collection!!):

# classes, # orders; # families, # subfamilies, # specimens, # pointed specimens, # of self-collected specimens

Be ready with a draft of the above score list for your collection inspection

grade: 1000 points = 100% so... 850 = 85%, 750 = 75%, etc. [maximum of 1100 pts allowed]

\(^1\) Note – average pointing rate, once trained, is about 30 specimens per hour. Pinning rate is 55 specimens per hour. You should expect to spend 3h/wk outside of lab time on your collection (~90 pointed specimens per week). Also note: +20 bonus pts for specimens of Strepsiptera, crab louse, or Mecoptera
You will need all 3 hours of each lab to make adequate progress on your collections and you will need time outside of lab as well. Don’t procrastinate!