



COURSE SYLLABUS

COURSE TITLE:	PBIO 230 On the Origin and Life of Animals		
COURSE CODE:	27320	TERM:	Winter term 2017-18
COURSE CREDITS:	3.0	DELIVERY:	3L/4P
CLASS SECTION:	01	START DATE:	Jan 4 2018
LECTURE LOCATION:	rm 124 Biology	LAB LOCATION:	Room 212 Biology
LECTURE TIME:	T/Th 10:00 – 11:20	LAB TIME:	Thursday 1:30 to 5:20 pm
WEBSITE:	via PAWS/Blackboard		

Course Description

This course will examine the evolutionary origin, structure-function and ecological relationships of animals, with an emphasis on the major invertebrate groups.

Prerequisite(s): BIOL 120 and one of BIOL 121 or GEOL 122

Course Themes

This course will be taught using the following themes:

1. the biodiversity of modern invertebrate groups in relation to their evolution;
2. morphology to illuminate the diversity of invertebrate animals;
3. the role of invertebrates in ecosystems;
4. application of knowledge about invertebrates, including in human and animal health

Learning Outcomes

On successful completion of this course, students will have demonstrated their ability to

1. explain the origins of animals and invertebrate groups using an evolutionary framework
2. describe the morphological characteristics of the major groups of invertebrates
3. provide specific examples of invertebrate impacts on human and animal health and the environment;
4. discuss important adaptations of invertebrates to their environment;
5. use a variety of animal specimens and examples to acquire knowledge;
6. find and interpret contemporary research articles in journals about invertebrate zoology;
7. communicate their acquired knowledge in written form.

Note: The University of Saskatchewan Learning Charter is intended to define aspirations about the learning experience that the University aims to provide, and the roles to be played in realizing these aspirations by students, instructors and the institution. A copy of the Learning Charter can be found at http://www.usask.ca/university_secretary/LearningCharter.pdf More information on University policies on course delivery, examinations and assessment of student

learning can be found at: <http://policies.usask.ca/policies/academic-affairs/academic-courses.php>

Detailed Course Schedule

Week Dates Instructor	Major Lecture Topics	Laboratory Activity
Week 1 Jan 4 Marchant	<ul style="list-style-type: none"> • Introduction to the course. • Review the tree of life • Review important characteristics of animals: multicellularity, locomotion (specifically nervous system and muscles), reproductive strategies and embryological considerations (diploblastic vs triploblastic animals, protostomes vs deuterostomes, types of embryonic cleavage) • Introduction to the methods used to understand the phylogeny of animals (morphology, molecules and fossils) <p><u>Readings:</u> Textbook Chapters 2 4, 5, 28; Blackboard material</p>	<p>Student training session scheduled with Library staff</p>
Week 2 Jan 9 & 11 Mangano	<p>The Pre-Cambrian origin of Animals</p> <p><u>Readings:</u> Textbook Chapter 1; Blackboard material</p>	<p>Lab #1 Introduction to Invertebrate Journal requirement</p> <p>The Animal Tree of Life & PreCambrian & Cambrian Animals</p> <p><u>Learning Assessment:</u> Submission of Invertebrate Journal for formative assessment/feedback of Lab 1</p>
Week 3 Jan 16 & 18 Mangano	<p>The Cambrian explosion and the early evidence of modern phyla</p> <p><u>Readings:</u> Textbook Chapter 1; Blackboard material</p>	<p>Lab #2</p> <p>Choanoflagellates Poriferans</p> <p><u>Readings:</u> Lab manual and supporting information in textbook Chapters 3 & 6.</p> <p><u>Learning Assessment (4%):</u> Submission of Invertebrate Journal for substantive assessment of Labs 1 & 2.</p>

<p>Week 4 Jan 23 & 25 Marchant</p>	<p>The Life of Choanoflagellates The Life of Poriferans <u>Readings:</u> Textbook Chapters 3 and 6; Blackboard material</p>	<p>Lab #3 Cnidarians <u>Readings:</u> Lab manual and supporting information in textbook Chapter 7.</p>
<p>Week 5 Jan 30 Feb 1 Marchant</p>	<p>The Life of Cnidarians The Life of Ctenophores <u>Readings:</u> Textbook Chapters 7 and 8; Blackboard material</p>	<p>Lab #4 The Spiralia - Part A Platyhelminthes <u>Readings:</u> Lab manual and supporting information in textbook Chapter 10.</p>
<p>Week 6 Feb 6 & 8 Marchant</p>	<p>Introduction to Bilateria, Protostomes & Deuterostomes The Spiralia: The Life of Platyhelminthes <u>Readings:</u> Textbook Chapters 9 and 10; Blackboard material</p>	<p>Lab #5 The Spiralia - Part B Annelida <u>Readings:</u> Lab manual and supporting information in textbook Chapter 14. <u>Learning Assessment (12%):</u> Submission of Invertebrate Journal for substantive assessment of Labs 3 to 5</p>
<p>Week 7 Feb 13 & 15 Angrini</p>	<p>The Spiralia: The Life of Annelida The Spiralia: The Life of Mollusca <u>Readings:</u> Textbook Chapters 13 and 14; Blackboard material</p>	<p>Lab #6 The Spiralia - Part C Mollusca (Bivalvia) <u>Readings:</u> Lab manual and supporting information in textbook Chapter 13.</p>
<p>Feb 20 & 22</p>	<p>Midterm Break – no Lectures</p>	<p>Midterm Break – no Lab</p>
<p>Week 8 Feb 27 Mar 1 Angrini</p>	<p>The Spiralia: The Life of Mollusca <u>Readings:</u> Textbook Chapter 13; Blackboard material</p>	<p>Lab #7 The Spiralia - Part D Mollusca (Cephalopoda) <u>Readings:</u> Lab manual and supporting information in textbook Chapter 13.</p>
<p>Week 9 Mar 5</p>	<p><u>Learning Assessment (20%)</u> Mid-Term Examination up to and including Annelida. 4:45 to 6:15 pm Room TBA</p>	

<p>Week 9 Mar 6 & 8 Angrini</p>	<p>The Ecdysozoa: The Life of Nematoda The Arthropoda: The Life of Myriapoda</p> <p><u>Readings:</u> Textbook Chapters 18, 20 and 23; Blackboard material</p>	<p>Lab #8 The Ecdysozoa – Part A Chelicerata & Myriapoda</p> <p><u>Readings:</u> Lab manual and supporting information in textbook Chapters 23 & 24.</p>
<p>Week 10 Mar 13 & 15 Angrini</p>	<p>The Arthropoda: The Life of Chelicerata The Arthropoda: The Life of Crustacea</p> <p><u>Readings:</u> Textbook Chapters 21 and 24; Blackboard material</p>	<p>Lab #9 The Ecdysozoa - Part B Crustacea</p> <p><u>Readings:</u> Lab manual and supporting information in textbook Chapter 21.</p>
<p>Week 11 Mar 20 & 22 Angrini</p>	<p>The Arthropoda: The Life of Hexapoda</p> <p><u>Readings:</u> Textbook Chapter 22; Blackboard material</p>	<p>Lab #10 The Ecdysozoa – Part C Hexapoda</p> <p><u>Readings:</u> Lab manual and supporting information in textbook Chapter 22.</p>
<p>Week 12 Mar 27 & 29 Marchant</p>	<p>The Deuterostomia: The Life of Ambulacraria The Life of Chordates</p> <p><u>Readings:</u> Textbook Chapters 25, 26 and 27; Blackboard material</p>	<p>Lab #11 The Deuterostomia Echinoderms Hemichordates</p> <p><u>Readings:</u> Lab manual and supporting information in textbook Chapters 25, 26 & 27.</p> <p><u>Learning Assessment (24%):</u> Submission of Invertebrate Journal for substantive assessment of Labs 7 to 11</p>
<p>Week 13 Apr 3 & 5 Mangano</p>	<p>A macroevolutionary perspective: follow-up of the Cambrian explosion and construction of the modern marine ecosystem.</p> <p><u>Readings:</u> Textbook Chapter 28; Blackboard material</p>	<p>No formal lab activity scheduled.</p>
	<p><u>Learning Assessment (40%)</u> Final Examination during regular exam period.</p>	

Course Overview & Structure:

This course consists of 3 hours of face-to-face lecture per week, and a 4-hour lab in each of 11 weeks. Generally speaking, the laboratory exercises are designed to illustrate specific aspects relating to the morphology, evolutionary and/or ecology of an invertebrate group. The lectures will tend emphasize broader evolutionary and ecological relationships or concepts relating to the various life styles of each invertebrate group. The course is specifically designed so that the laboratory exercise for an invertebrate group generally occurs before the lectures about that group have commenced (or at least concluded). The intent of this flipped lecture and lab is to have students learn substantial details about an invertebrate group on their own before they arrive in the laboratory. This prior learning will be reinforced during the laboratory. The lecture can then focus on more general and integrative aspects, allowing for more interaction between the instructor and students. The teaching methods have been designed to facilitate the development of a strong knowledge base in animal origins and invertebrate biology. Course content will be explored in a way that explains difficult concepts and encourages students' participation in the learning process.

Attendance at the laboratories is required. These practical sessions provide learning activities that are essential to the achievement of the learning outcomes of the course. New content is covered in these laboratories and more skills and competencies will be acquired. Students will be responsible for some advanced reading prior to attending each laboratory session and for seeking new knowledge during the lab period. This can be from the textbook or online sources; computers will be available for this during the lab period. Students will use microscopic examination and dissection to study invertebrates, and search for supporting information online. Overall, the laboratory exercises will allow students to develop their skills at identifying and describing animals, as well as searching and interpreting the scientific literature in invertebrate biology. Students will work in groups of three and will develop teamwork and problem-solving skills by learning from each other.

Students will summarize their learning each week through written entries in an Invertebrate Journal. Specific material to be included in the Journal entry for each week is described in the lab manual. This includes student-generated figures, written answers to open-ended questions in the lab manual and a one-paragraph summary of a scientific research article pertinent to the laboratory exercise. Students will work individually on their journal entry and complete these before the end of the lab period. More information about the Invertebrate Journal requirements are available in the lab manual and will be detailed in the first lab session. There will be a formative assessment of the Journal after the first lab period to provide students with feedback on their Journal. Students will be allowed to correct any deficiencies noted in their Journal before it is graded. After that, summative assessments will be made at regular intervals (see Assessment Details below).

Instructors:

Contact Information:

Dr. Tracy Marchant (Course Coordinator)	room 322 Biology 306-966-4420	tracy.marchant@usask.ca
Dr. Manar Angrini	room 324 Biology 306-966-4437	manar.angrini@usask.ca
Dr. Gabriela Mangano	room 334 Geology 306-966-5730	gabriela.mangano@usask.ca
Dr. Doug Smith (Labs)	room 150 Biology 306-966-4415	dh.smith@usask.ca

Office Hours: Generally speaking, the instructors above will be available in their offices on a drop-in basis. However, please note that all instructors have other commitments that may take them away from their office. Specific appointments can be set by email or over the phone. Email responses to specific questions about course material are at the discretion of each instructor.

Instructor Profiles & Other Information:

All instructors in PBIO 230 hold at least a PhD. Dr. Marchant and Dr. Angrini are faculty members in the Department of Biology. They teach and conduct research in the area of zoology and animal physiology. Dr. Mangano is a faculty member in the Department of Geological Sciences. She teaches in the area of sedimentology and paleontology and conducts research in ichnology and evolutionary paleoecology. Dr. Smith is an instructor and lab coordinator in the Department of Biology with a special interest in the biology of insects.

Required & Supplementary Resources

Textbook: Brusca, R.; Moore, W.; and Shuster, S. 2016. Invertebrates. Sinauer Associates, Inc., Sunderland. 3ed. Available through the bookstore.

Additional required readings will be posted on Blackboard at the discretion of the instructor.

Laboratory Manual: this will be available as a download from Blackboard.

Computer Account & the Use of Digital Cameras or Other Recording Devices: Students need to be able to access their university computer account during the laboratory period. They will also be required to use their smart phones, tablets or digital cameras to take images of specimens during the laboratory so that these can be incorporated into their electronic Invertebrate Journal. Images captured during the laboratories may only be shared amongst students in PBIO 230 and shall not be not posted online or otherwise distributed, except as approved by the instructors.

Recording devices are not permitted during the lectures, except when an accommodation is required as a result of registration with AES (see below).

Grading Scheme

Overall, assessment is designed to ensure students have attained the learning outcomes for the course.

Assessment Item	Weighting	Relevant Learning Outcomes	Due Date and Time
Mid-Term Exam	20% of the final course grade	1, 2, 3, 4, 7	Refer to Course Timetable
Final Exam	40% of the final course grade	1, 2, 3, 4, 7	Refer to Course Timetable
Invertebrate Journal	40 % of the final course grade as follows: 4% for Labs 1 & 2 12% for Lab 3 to 5 24% for Labs 6 to 11	1, 2, 3, 4, 5, 6, 7	Refer to Course Timetable

Learning Assessment Details

Mid-Term Examination:

This individual closed book examination is designed to assess students' knowledge and understanding of the core concepts covered in the first half of the course. The exam will cover both the lab and lecture material up to the end of Phylum Annelida. The exam will consist of multiple-choice and/or written-answer questions to be completed in a 90 minute time period. Please refer to your course timetable for the examination date and time. Note that the 90-minute exam is scheduled for a special time outside of the regular lecture and laboratory periods.

Final Examination:

This individual 3-hour closed-book cumulative examination is designed to assess a student's knowledge and understanding of material from the entire course. The exam will consist of multiple-choice and/or written-answer questions. Material from the laboratory will also be tested on the final exam. Consult the Final Exam Schedule when it is released for the examination date and time. Students who miss the final exam for a valid reason must contact the College of Arts & Science and apply for a deferred final exam. Deferred exams may utilize a different format than the regular exam. Students are encouraged to review all University examination policies and procedures: <http://policies.usask.ca/policies/academic-affairs/academic-courses.php>

Invertebrate Journal: This is to be completed individually, although students will work in groups on certain aspects of the lab exercises; group vs individual work is clearly indicated in the lab manual. Students are required to communicate their observations of live, preserved, and sectioned animals by developing scientific descriptions, classifications, and labeled sketches or figures for animals studied in each lab. In addition, students are required to answer questions or complete other small writing assignments from the lab manual. Prior to each lab, each student will search the scientific literature and locate a recently published article to be used in the writing of a one-paragraph summary and a statement about the relevance of the article to the lab topic.

All journal components must be completed within the lab time period and all journals must be submitted via Blackboard before the end of the lab period. Formative feedback on the journal will be provided to each student after the first lab period. Subsequent assessments will be substantive in nature and count towards the final course grade (see the Detailed Course Schedule above). Information contained in the Invertebrate Journal will be tested on the Midterm and Final exams. The Invertebrate Journal will be graded and returned prior to the exams.

Lab Attendance Expectations

Students are expected to attend, and be on time, for all scheduled labs. A student who arrives late may be penalized by a 10% deduction on the learning assessment for that lab period, and in serious cases, may even be excluded from the laboratory session by the instructor. In that case, the student will receive a grade of zero for that lab activity.

It is impossible to schedule make-up labs for this course. Students who miss a lab period are assigned a mark of zero for the work that was to be completed during the missed lab period. Students are required to contact the lab coordinator prior to the end of the lab period if they are too ill to attend the lab or are facing extenuating personal circumstances that requires them to be away from the University. When a lab is missed due to illness or personal circumstances, the marks associated with the missed lab exercise will be distributed to the remaining lab exercises in that assessment period.

Criteria That Must Be Met to Pass

Students must write the final exam in order to pass the course. Students who do not write the final exam will be assigned a final course grade of 49%, or lower depending on their performance in other aspects of the course, along with a grade comment of INF (Incomplete Failure). The final grade will be adjusted if a deferred final exam is written (see below).

Midterm and Final Examination Scheduling

The midterm must be written on the day scheduled. If a student is unable to write the midterm at the scheduled time due to other course or work commitments, students must make themselves available to write the midterm at another time on that day. The University Administration schedules final course examinations between April 9 to 28. Students should therefore avoid making prior travel, employment, or other commitments for this period. **Students who miss the final exam must contact the College and apply for a deferred final exam.** Deferred exams may utilize a different format than the regular exam, at the sole discretion of the instructors. Students are encouraged to review all University examination policies and procedures (see links above).

Copyright

All previously-published material used in this course under the fair-use provisions of Canadian copyright legislation or with permission of the copyright holder. The instructors retain copyright of their own work. Students shall refrain from redistributing any material provided to them, except with the permission of the instructors.

Student Feedback

The Department of Biology or the instructors may survey students regarding the course. This is generally done through an in-class assessment.

Recording of the Course

Students are not allowed to record the lectures in this course, except with the permission of the instructors or as provided for by arrangements with Access and Equity Services. Any recording made under these provisions are to only be used for the personal learning of the student who made the recording.

University of Saskatchewan Grading System

Students are reminded that the University has established a grading system to be used in all of its courses. Information on literal descriptors for grading at the University of Saskatchewan (reproduced below) can be found at:

<https://students.usask.ca/academics/grading/grading-system.php>

Exceptional (90-100) A superior performance with consistent evidence of

- a comprehensive, incisive grasp of the subject matter;
- an ability to make insightful critical evaluation of the material given;
- an exceptional capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Excellent (80-90) An excellent performance with strong evidence of

- a comprehensive grasp of the subject matter;

- an ability to make sound critical evaluation of the material given;
- a very good capacity for original, creative and/or logical thinking;
- an excellent ability to organize, to analyze, to synthesize, to integrate ideas, and to express thoughts fluently.

Good (70-79) A good performance with evidence of

- a substantial knowledge of the subject matter;
- a good understanding of the relevant issues and a good familiarity with the relevant literature and techniques;
- some capacity for original, creative and/or logical thinking;
- a good ability to organize, to analyze and to examine the subject material in a critical and constructive manner.

Satisfactory (60-69) A generally satisfactory and intellectually adequate performance with evidence of

- an acceptable basic grasp of the subject material;
- a fair understanding of the relevant issues;
- a general familiarity with the relevant literature and techniques;
- an ability to develop solutions to moderately difficult problems related to the subject material;
- a moderate ability to examine the material in a critical and analytical manner.

Minimal Pass (50-59) A barely acceptable performance with evidence of

- a familiarity with the subject material;
- some evidence that analytical skills have been developed;
- some understanding of relevant issues;
- some familiarity with the relevant literature and techniques;
- attempts to solve moderately difficult problems related to the subject material and to examine the material in a critical and analytical manner which are only partially successful.

Failure <50 An unacceptable performance

Integrity Defined (from the Office of the University Secretary)

The University of Saskatchewan is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Student Conduct & Appeals section of the University Secretary Website and avoid any behavior that could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University. For more information on what academic integrity means for students see the Student Conduct & Appeals section of the University Secretary Website at:

<http://www.usask.ca/secretariat/index.php> All students should read and be familiar with the Regulations on Academic Student Misconduct as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals available on the University Secretary Website.

Student Supports

Student Learning Services

Student Learning Services (SLS) offers assistance to U of S undergrad and graduate students. For information on specific services, please see the SLS web site

<https://library.usask.ca/studentlearning/>.

Student and Enrolment Services Division

The Student and Enrolment Services Division (SESD) focuses on providing developmental and support services and programs to students and the university community. For more information, see the SESD web [site http://teaching.usask.ca/](http://teaching.usask.ca/).

College Supports

Students in Arts & Science are encouraged to contact the Undergraduate Student Office and/or the Trish Monture Centre for Success with any questions on how to choose a major; understand program requirements; choose courses; develop strategies to improve grades; understand university policies and procedures; overcome personal barriers; initiate pre-career inquiries; and identify career planning resources. Contact information is available at:

<http://artsandscience.usask.ca/undergraduate/advising/>

Examinations through Access and Equity Services (AES)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with AES if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals. In order to access AES programs and supports, students must follow AES policy and procedures. For more information, check <https://students.usask.ca/health/centres/access-equity-services.php> or contact AES at 966-7273 or aes@usask.ca.

Students who are in need of accommodation for the course must present the appropriate letter from AES to the course coordinator. Students registered with AES may require alternative arrangements for examinations. Students must arrange such accommodations through AES by their stated deadlines.