**COURSE SYLLABUS**

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| COURSE TITLE: | **PBIO 230** **On the Origin and Life of Animals** | | |
| COURSE CODE: | 27320 | TERM: | Winter term (T2) 2023 |
| COURSE CREDITS: | 3.0 | DELIVERY: | 3L/4P |
| CLASS SECTION:  LECTURE LOCATION:  LECTURE TIME:  WEBSITE: | 01  Geology room 161  T/Th 10:00 – 11:20  via PAWS/Canvas | START DATE:  LAB LOCATION:  LAB TIME: | Jan 4 2023 (lectures)  Jan 9 2022 (labs)  Thorvaldson room G11  Mondays 1:30 to 5:20 pm |

# 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, especially as it relates to feeding, locomotion and reproduction;
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 are expected to:

1. explain the origins of animals and invertebrate groups using an evolutionary framework and examples from the fossil record
2. recall the morphological characteristics of the major groups of invertebrates
3. relate specific examples of invertebrate impacts on human and animal health and the environment;
4. explain important adaptations of invertebrates to their environment;
5. interpret contemporary research articles from journals about invertebrate zoology;
6. communicate their acquired knowledge in visual and written form;
7. work competently and efficiently with other students and the course instructors.

Information on literal descriptors for grading at the University of Saskatchewan and more can be found in the Academic Courses Policy on course delivery, examinations and assessment of students learning: <http://students.usask.ca/academics/grading/grading-system.php>

Please note: There are different literal descriptors for undergraduate and graduate students.

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: <https://teaching.usask.ca/about/policies/learning-charter.php>

# Treaty Acknowledgement

As we gather here today, we acknowledge that the Saskatoon campus of the University of Saskatchewan is on Treaty Six Territory and the Homeland of the Métis. We pay our respect to the First Nation and Métis ancestors of this place and reaffirm our relationship with one another.

# Course Overview

The course consists of 3 hours of face-to-face lectures on the T/Th schedule and a 4-hour lab each week. Generally-speaking, the laboratory exercises are designed to illustrate specific aspects relating to the morphology, evolution and/or ecology of an invertebrate group. The lectures will tend emphasize broader evolutionary and ecological relationships or concepts relating to the various lifestyles of each invertebrate group.

The course is specifically designed so that the laboratory exercise for an invertebrate group occurs before the lectures about that group have commenced. The intent of this “reversed” lecture and lab is to have you learn substantial details about an invertebrate group before coming to the lecture. 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. 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 be placed in groups of three or four, and each group will be assigned a Group Homepage on Canvas where they can share information and work together. However, the lab exercises require that each student complete all the activities outlined in the lab manual. We have designed these activities to maximize the individual learning that is needed for the lab quizzes and course exams. We anticipate that each lab exercise will require the full four hours to complete with some additional time (one to two hours) spent as preparation time in advance of each lab.

# Detailed Course Schedule

| **Week**  **Lecture**  **Instructor** | **Major Lecture Topics** | **Laboratory Activity** |
| --- | --- | --- |
| **Week 1**  Marchant & Mángano | Thursday January 5  • Introduction to the course  • Review of the Tree of Life  • Introduction to Ancient Life  *Readings: Textbook Chapters 1 & 28; other materials on Canvas* | No Lab This Week |
| **Week 2**  Mángano | **T/Th January 10 & 11**  The Ediacaran origin of animals  *Readings: Chapter 1; other materials on Canvas* | **Monday January 9**  **Lab Exercise 1** - The Ediacaran & Cambrian Animals  *Readings: Lab Manual, other materials on Canvas* |
| **Week 3**  Mángano | **T/Th January 17 & 19**  The Cambrian explosion and origin of modern animal phyla  *Readings: Chapter 1; other materials on Canvas* | **Monday January 16**  **Expert Seminar 1** - On Animal Origins *Readings: materials on Canvas*  **Lab Exercise 2** - Choano-flagellates & Poriferans  *Readings: Lab manual and textbook Chapter 5* |
| **Week 4**  Marchant | **T/Th January 24 & 26**  The Life of Choanoflagellates & Poriferans    *Readings: Textbook Chapter 5; other materials on Canvas* | **Monday January 23**  **Lab Exercise 3** - Cnidarians  *Readings: Lab manual and textbook Chapter* 7. |
| **Week 5**  Marchant | **T/Th January 31 & February 2**  The Life of Ctenophores & Cnidarians  *Readings: Textbook Chapters 6 (part) and 7; other materials on Canvas* | **Monday January 30**  **Lab Exercise 4** - The Spiralia Part A – Platyhelminthes  *Readings: Lab manual and textbook Chapter 17.* |
| **Week 6**  Marchant | **T/Th February 7 & 9**  Introduction to Bilateria, Protostomes & Deuterostomes  The Spiralia: The Life of Platyhelminthes  *Readings: Textbook Chapters 8, 10 (part) and 17; other materials on Canvas* | **Monday February 6**  **Lab Exercise 5** - The Spiralia Part B - Mollusca (Bivalves)  *Readings: Lab manual and textbook Chapter 13.* |
| **Week 7**  Shillito | **T/Th February 14 & 16**  The Spiralia: The Life of Mollusca  *Readings: Textbook Chapter 13; other materials on Canvas* | **Monday February 13**    Midterm Lab Quiz 10% (20-30 minutes at start of lab period; covers Labs 1 to 5)  Lab Exercise 6 - The Spiralia Part C - Mollusca (Cephlapods)  *Readings: Lab manual and textbook Chapter 13.* |
| Feb 20-24 | Midterm Break – no Lectures | Midterm Break – no Lab |
| **Week 8**  Shillito | **T/Th Feb 28 & March 2**  The Spiralia: The Life of Annelida  *Readings: Textbook Chapter 15; other Canvas material* | Monday February 27  Lab Exercise 7 - The Spiralia Part D - Annelids  *Readings: Lab manual and textbook Chapter 15.* |
| **Week 9**  Shillito | T/Th March 7 & 9  The Ecdysozoa: The Life of Nematoda  The Arthropoda: The Life of Myriapoda  *Readings: Textbook Chapters 19, 20 and 23; other Canvas material* | Monday March 6  **Expert Seminar 2** - On Annelid Origins and Evolution *Readings: materials on Canvas*  Lab Exercise 8 - The Ecdysozoa Part A - Chelicerates & Myriapods  *Readings: Lab manual and textbook Chapters 23 & 24.* |
| **Week 10**  Shillito | **T/Th March 14 & 16**  The Arthropoda: The Life of Chelicerata  The Arthropoda: The Life of Crustacea  *Readings: Textbook Chapters 21 and 24; Canvas material* | **Monday March 13**  Lab Exercise 9 - The Ecdysozoa – Part B Crustacean  *Readings: Lab manual and textbook Chapter 21.* |
| **Week 11**  Shillito | **T/Th March 21 & 23**  The Arthropoda:  The Life of Hexapoda  *Readings: Textbook Chapter 22; Canvas material* | **Monday March 20**  Lab Exercise 10 - The Ecdysozoa - Part C Hexapods  *Readings: Lab manual and textbook Chapter 22.* |
| **Week 12**  Marchant | **T/Th March 28 & 30**  The Deuterostomia  The Life of Ambulacraria  *Readings: Textbook Chapters 25 & 26; Canvas material* | **Monday March 27**  **Expert Seminar 3** – On Crustacean Evolution and Terrestrialization Process  *Readings: materials on Canvas*  Lab Exercise 11 - The Deuterostomia - Echinoderms  *Readings: Lab manual and textbook Chapters 26* |
| **Week 13**  Mángano | **Tuesday April 4**  A macroevolutionary perspective: follow-up of the Cambrian explosion and construction of the modern marine ecosystem.  *Readings: Textbook Chapter 28; Canvas material* | **Monday April 3**  Final Lab Quiz 20% (40-45 min during lab period, comprehensive) |
|  | Final Examination 40%  During regular exam period.  Note that the exam period this year runs from April 10 to 29. |  |

# Instructors:

# Contact Information:

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| --- | --- | --- |
| Dr. Tracy Marchant  (Course Coordinator) | 306-966-4420  rm 120.3 CSRB | Use Canvas messages or tracy.marchant@usask.ca |
| Dr. Gabriela Mángano | 306-966-5730  rm 346 Geology | gabriela.mangano@usask.ca |
| Dr. Anthony Shillito | Phone TBA  rm 32 Geology | anthony.shillito@usask.ca |
| Dr. Doug Smith (Labs) | 306-966-4415  rm G11.7 Thorv | dh.smith@usask.ca |

**Communicating With Your Instructors:** Your instructors are routinely available by email/Canvas messages or phone. We can also schedule an in-person or a virtual meeting as needed.

## Instructor Profiles & Other Information:

All instructors in PBIO 230 hold at least a PhD. Dr. Marchant is a faculty member in the Department of Biology and conducts research in the area of animal physiology. Dr. Mángano 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. Also from Geological Sciences, Dr. Shillito holds a Banting Postdoctoral Fellowship. He conducts research on the initial transition of animals from the ocean to land by and is particularly interested in what ichnology has recorded about this process. Dr. Smith is an instructor and lab coordinator in the Department of Biology with a special interest in the biology of insects. There will also be teaching assistants assigned to help you in the labs.

# Required Resources

## Textbooks

## Brusca, R.; Giribet, G. and W. Moore. 2022.Invertebrates. 4th edition. Oxford University Press. *This book is essential to the course. Purchase the online version.*

Additional required readings will be posted on Canvas.

Laboratory Manual: this will be available as a download from Canvas and can be used in electronic.

## Computers & Smart Phones

The weekly lab exercises make extensive use of computers to record information learned during the lab period and to consult the textbook and other online materials. Smart phones are used to record images of specimens. As a result, you are encouraged to bring your personal electronic devices to the laboratories. Some USask-managed computers are available in the lab room when your personal device is not appropriate or available.

Grading Scheme

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

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| --- | --- | --- | --- |
| **Assessment Item** | **Weighting** | **Relevant Learning Outcomes** | **Due Date** |
| Final Exam | 40% of final course grade | 1, 2, 3, 4, 5, 6 | to be determined |
| Group Invertebrate Journal | 20% of final course grade | 1, 2, 5, 6, 7 | weekly |
| Lab Quizzes (2) | 30% of final course grade | 1, 2, 3, 6 | Feb 13 (10%)  Apr 3 (20%) |
| “Ask an Expert” Group Seminar Report | 6% of final course grade | 1, 4, 5 | Jan 16  Mar 6  Mar 27 |
| Contribution to Course & Group Work | 4% of final course grade | 7 | Apr 5 |

## Final Exam

**Value**: 40% of final course grade

**Date**: Consult the Final Exam Schedule when it is released

**Length:** 180 minutes

**Format**: An in-person Canvas exam in a computer lab, with a mix of short answer (e.g. multiple choice questions and those requiring a written answer.

**Description**: The exam is comprehensive in that it will cover all course material with roughly equal weighting to all portions of the course. Lab material is inherently incorporated into the lectures and students are encouraged to view the course as an integrated unit.

**Group Lab Work - Invertebrate Journal**

**Value**: 20% of final grade

**Date**: At the end of each lab period

**Format**: Written and photographic submission from each group

**Description**: Each week, student groups will conduct various activities during the lab period. Each group will keep track of their learning in a written document called an Invertebrate Journal. This is to be prepared using the collaborative tools in Canvas. Approximately 1 hour at the end of the lab period will be set aside to finalize the contents of your group’s Invertebrate Journal. The Journal is to be submitted by the end of each lab period. At that time, a specific activity will be randomly assigned to each group for assessment and feedback from the TAs. The journals will be submitted to Canvas in such a way that all Invertebrate Journals and any TA feedback will be visible to all students in the course. However, the specific grade for the assigned to the group for their Invertebrate Journal submission will remain confidential.

**Laboratory Quizzes**

**Value**: 30% of final grade (2 quizzes worth 10% and 20%)

**Date**: Feb 13 (on Labs 1 to 5) and Apr 3 (comprehensive), during the regular lab period

**Format**: Spot test based on lab specimens and examples

**Description**: Students will move between stations that contain questions about specimens and examples from the lab exercises. Students will be given 1 minute to answer the question at each station. Specific material that will be covered by each quiz is indicated above. The final lab quiz will be comprehensive in scope but with a bit more emphasis on material since the first lab quiz.

**“Ask an Expert”** **Group Seminar Report**

**Value**: 6% of final grade

**Date**: Preliminary question list is due Friday each expert seminar; final seminar report Tuesday after each seminar

**Format**: Written submissions (three) one per group for each of the presentations

**Description**: Three experts in invertebrate palaeobiology will present a 45-minute Zoom seminar at the beginning of selected lab periods (see course schedule for dates and topics of these seminars). For each seminar, your group will be tasked with reading a research article authored by the expert. This is to be done well in advance of the seminar. Your group is to discuss the paper and develop three questions to ask the expert at the end of their seminar. The questions from your group are to be submitted via Canvas on Friday morning before the lecture. Faculty will evaluate the group questions, looking for clarity of thought and duplication between groups, and provide feedback as needed prior to the seminar. Groups can then adjust their question before asking the expert on the following Monday. Each group is required to ask the expert at least one question during the seminar question period. Your group will then prepare a short (one paragraph) written submission summarizing the answer to your question as provided by the expert. This Group Seminar Report will also include a one-paragraph description of the most-important take-home message from the seminar. The Group Seminar Report will be assessed based on clarity of writing and thought, as well as accuracy of the information included in the Report.

**Contribution to Course & Group Work**

**Value**: 4% of final grade

**Date**: April 5 (last day of term)

**Format**: Survey Monkey submission

**Description**: One of the learning outcomes for this course is the development of group working skills. You will use a Survey Monkey assessment tool to honestly and carefully evaluate your contributions and those of other members to the work of the group. The Survey Monkey tool will assess contributions in six categories, with a ranking scale of 1 to 4 in each category: Cooperation & Attitude, Ability To Work with Others, Focus & Commitment, Fulfillment of Group Role, Ability to Communicate and Time Management & Work Ethic.

# Lab Attendance Expectations

Students are expected to attend each lab period and work with their group to complete the work required of them in the lab manual. It is impossible to schedule make-up labs for this course. You must contact one of the instructors prior a lab quiz if you are unable to due to illness or extenuating personal circumstances. Marks associated with the missed quiz will be distributed to remaining course components as determined by the instructor. Note that each situation will be judged and determined separately.

# Submitting Group Assignments

Assignment will be submitted via the course Canvas. Each assignment page has a specific deadline. A submission after this deadline will be marked late. A late assignment will receive an automatic 20% deduction from its evaluation score for all members of the group. Submission of more than two assignments past their deadline will also result in an automatic 25% reduction in the **Contribution to Course & Group Work** assessment**.** Note that all group assignments will be made visible to all other students in the course, although grades will remain confidential.

# Final Examination Scheduling

Final examinations must be written on the date scheduled. This may be scheduled at any time during the examination period (Apr 10 to 29); students should therefore avoid making prior travel, employment, or other commitments for this period.  If you are unable to write the final exam, you 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, at the sole discretion of the course instructors. Students are encouraged to review all University examination policies and procedures: <http://students.usask.ca/academics/exams.php>

# Recording of the Course

Students are not allowed to record any aspect of 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 is to be used only for the personal learning of the student who made the recording. Instructors may record lectures and make these available as study tools but students must not rely on these recordings being available. Students are expected to attend lectures except when ill or away for compassionate reasons. Each instructor will make the decision about recording and publishing their lectures. For questions about recording and use of sessions in which you have participated, including any concerns related to your privacy, please contact your instructor. More information on class recordings can be found in the Academic Courses Policy: [https://policies.usask.ca/policies/academic-affairs/academic-courses.php]( https://policies.usask.ca/policies/academic-affairs/academic-courses.php)

# Copyright

Course materials are provided to you based on your registration in the class, and anything created by your professors and instructors is their intellectual property, unless materials are designated as open education resources. Copyright-protected material includes exams, PowerPoint/PDF slides and other course notes. Additionally, other copyright-protected materials created by textbook publishers and authors may be provided to you based on license terms and educational exceptions in the Canadian Copyright Act (see [http://laws-lois.justice.gc.ca/eng/acts/C-42/index.html)](http://laws-lois.justice.gc.ca/eng/acts/C-42/index.html).

**Before you copy or distribute others’ copyright-protected materials, please ensure that your use of the materials is covered under the University’s Fair Dealing Copyright Guidelines available at**[**https://library.usask.ca/copyright/general-information/fair-dealing-guidelines.php**](https://library.usask.ca/copyright/general-information/fair-dealing-guidelines.php).For example, posting others’ copyright-protected materials on the open web is not covered under the University’s Fair Dealing Copyright Guidelines, and doing so requires permission from the copyright holder.

For more information about copyright, please visit <https://library.usask.ca/copyright/index.php>

# Student Feedback

The Department of Biology or the instructors may survey students regarding the course. This is generally done through an assessment near the end of term.

# University of Saskatchewan Grading System

Students in PBIO 230 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 on PAWS and through links at: http://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 Matters

The University of Saskatchewan is committed to the highest standards of academic integrity (<https://academic-integrity.usask.ca/>).  Academic misconduct is a serious matter and can result in grade penalties, suspension, and expulsion.

**Prepare for Integrity**

Students are expected to act with academic integrity.

* Students are encouraged to complete the Academic Integrity Tutorial to understand the fundamental values of academic integrity and how to be a responsible scholar and member of the USask community (tutorial link: <https://libguides.usask.ca/AcademicIntegrityTutorial>) .
* Students can access campus resources that support development of study skills, time and stress management, and ethical writing practices important for maintaining academic integrity and avoiding academic misconduct.

**Responses to Misconduct**

All students should read and be familiar with the Regulations on Academic Student Misconduct ([https://governance.usask.ca/student-conduct-appeals/academic-misconduct.php - StudentAcademicMisconductRegulations](https://governance.usask.ca/student-conduct-appeals/academic-misconduct.php#StudentAcademicMisconductRegulations)) as well as the Standard of Student Conduct in Non-Academic Matters and Procedures for Resolution of Complaints and Appeals (<https://governance.usask.ca/student-conduct-appeals/non-academic-misconduct.php>)

# Examinations with Access and Equity Services (AES)

Students who have disabilities (learning, medical, physical, or mental health) are strongly encouraged to register with Access and Equity Services (AES) if they have not already done so. Students who suspect they may have disabilities should contact AES for advice and referrals at any time. Those students who are registered with AES with mental health disabilities and who anticipate that they may have responses to certain course materials or topics, should discuss course content with their instructors prior to course add / drop dates. In order to access AES programs and supports, students must follow AES policy and procedures. . In order to access AES programs and supports, students must follow AES policy and procedures. For more information or advice, visit <https://students.usask.ca/health/centres/access-equity-services.php>, or contact AES at 306-966-7273 or [aes@usask.ca](mailto:aes@usask.ca).

Students registered with AES may request alternative arrangements for mid-term and final examinations. Students must arrange such accommodations through AES by the stated deadlines. Instructors shall provide the examinations for students who are being accommodated by the deadlines established by AES.

# Student Supports

**Academic Support for Students**

Visit the [Learning Hub](https://library.usask.ca/studentlearning/) to learn how the University Library supports undergraduate and graduate students. Attend online or in-person workshops, review online resources or book 1-1 appointments for help with:

* First year experience
* Research
* Study strategies and skills
* Writing
* Math and Statistics

**Teaching, Learning and Student Experience**

The Teaching, Learning and Student Experience Unit (TLSE) focuses on providing developmental and support services and programs to students and the university community. For more information, see <https://students.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/>)