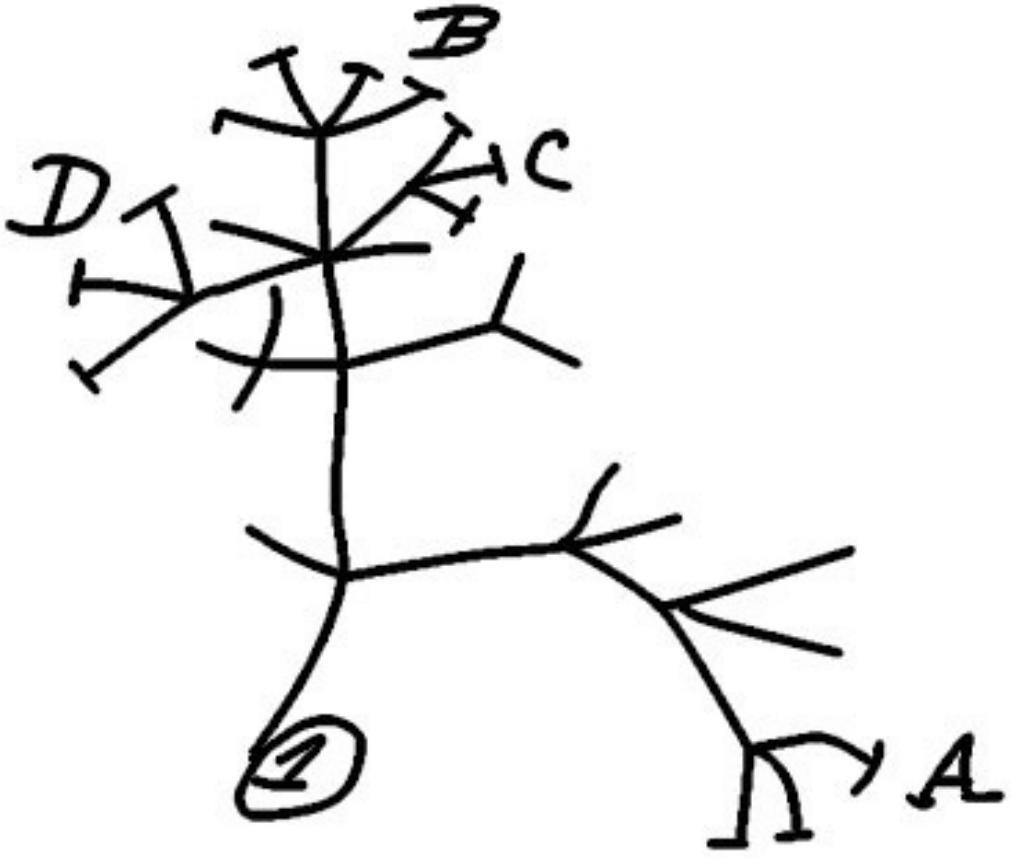
Species and Speciation

BIOD62

I think



Course Manual, 2017

Course description

Speciation is one of the most basic and important processes in evolutionary biology. It leads to the evolution of new species. The purpose of this course is to learn about the main mechanisms behind speciation and their causes. We will first discuss the life and teachings of Charles Darwin, the father of modern evolutionary biology, and how his ideas about natural selection and the origin of species were validated in the 20th century (Modern Synthesis). As a basis for all following chapters, the course will discuss genetic variation and different species concepts. We will then dissect different geographic speciation models, i.e. allopatric, peripatric, parapatric and sympatric speciation. Time will be dedicated to the different mechanisms of prezygotic reproductive isolation. For example, species which are ecologically isolated typically only occur and mate in their preferred habitat, minimizing gene flow between incipient species. Temporally isolated species have different temporal mating windows, while behaviorally isolated species may meet, but one species does not recognize the sexual cues of the other species and hence the two species do not mate. The course will then discuss the range of postzygotic isolating mechanisms, such as extrinsic and intrinsic postzygotic isolation. You will learn about reinforcement, a process by which natural selection increases reproductive isolation of incipient species, typically when two populations have been separated for a long time and then come back into contact. Upon such secondary contact and with incomplete reproductive isolation, mating between such taxa might produce unfit hybrids, which drives natural selection to enhance prezygotic reproductive isolation between these incipient species. The course will then discuss the importance of drift and natural selection as the main driving forces of speciation. Speciation sometimes occurs in a 'sudden burst' and into different ecological niches. This process is referred to as adaptive radiation, the penultimate topic of the course. The last topic will cover diversity through time and also discuss the flipside of speciation, extinction.

Course objectives

This course aims at communicating the science behind 'species and speciation' through both lecture and tutorial time, with the latter tightly paralleling the former. In both lecture time and tutorials, there will be a strong emphasis on active and deep learning, thus you are expected to come prepared to tutorials, and to actively participate in group learning activities. This dual approach of the course aims at teaching '*science literacy*' (the stuff on the midterm and final exams) and '*science communication*' (transferable skills). Another important skill this course aims at is how to give and receive peer feedback (for the paper and presentations; in tutorials). Assignments associated with these goals are: **(1) a written paper** (scientific data interpretation and writing skills; group work skills), **(2) presentation of lecture material in class** (oral presentation and group work skills) and **(3) a PPT presentation** on a published paper (oral skills and group work skills).

Course details

Instructor: Ivana Stehlik
Phone: 416-287-7422
Email: ivana.stehlik@utoronto.ca
Office hours: SW563C, Wed, 11 AM – 12.30 PM
Course lecture time and place: Mon, 3 - 5 PM
Tutorial time and place: Wed, 1-3 PM, HL106

Prerequisites: BIOC50

Marks breakdown

Midterm exam	24%
Final exam (cumulative)	33%
Quiz on meiosis	2%
Brush-up Blackboard quiz on genetic drift, bottleneck and founder effect	2%
Tutorial attendance[§]	2%
Data paper	11%
In class presentation	11%
PPT presentation	11%
Feedback on peer drafts of data papers	4%
Total	**100%**

[§]Automatic full mark allocation for full tutorial attendance (if you miss a tutorial due to reasons beyond your control, bring an official UTSC medical note)

Website

Class information will be provided on the course website on the U of T Portal: portal.utoronto.ca. You will need your UTORid and your password to access the site. Please refer to instructions on how to access the course website on blackboard using the information in http://www.portalinfo.utoronto.ca.

Lectures and other course material

Lectures will be posted in a dedicated BIOD62 class folder on Quercus, typically 24 hours before class, so you will either need to create a new (and free) dropbox account or you can use your pre-existing dropbox. In order to create your personal 2 GB dropbox account, please follow instructions online found under https://www.dropbox.com/pricing and by choosing the FREE option. Once you own a dropbox account, you will be able to follow the invitation sent to you by the instructor through email to join the dropbox class folder in the first week of classes. This invitation will be sent to your official university email account, so it is vital that you check your email inbox as soon as the course starts (no lecture material will be posted on Blackboard or intranet, so it is in your own interest to get access to all course materials through dropbox ASAP). Lectures will be posted typically the evening before class.

Attendance policy in tutorials

In contrast to lectures, attendance will be taken in all tutorials. If you miss tutorials due to illness or other causes beyond your control, submit, within one week of the missed lab, a written request for special consideration to the instructor explaining the reason for missing the event, and attaching appropriate documentation, such as the official University of Toronto medical certificate (www.utoronto.ca/health/form/medcert.pdf).

If you attend all tutorials, you will be granted an automatic 3% towards your final grade. There will be no partial grade for partial attendance, as this part of the final grade aims at optimizing the learning outcome in group-based activities, which rely on predictable student attendance and participation.

Penalty for late submission

There will be a penalty of 10% per day for assignments received late. Weekend days count as individual days. Unless there are extenuating circumstances (e.g. medical reasons with a medical certificate), a mark of zero will be applied to assignments submitted one week late or more. Heavy workloads or malfunctioning computer equipment are not legitimate reasons for late submission. If you know ahead of time that you have a legitimate reason why you cannot hand in the assignment, let the course instructor know before the due date.

Missed exams

Students who miss an exam or a deadline of an assignment for reasons entirely beyond their control must notify the instructor within 3 days that you missed the exam or deadline of the assignment. In case you do not do this, you will receive a 0 on the exam or assignment. Then submit your doctor's note or other documentation to Jennifer Campbell in SW421D. You may submit the doctor's note or other documentation for the reason AFTER you notify the instructor, ie you need to first and foremost notify the instructor for missing the exam or assignment. A make-up will be scheduled within 10 days of the original date, unless you provide a second form indicating that your problem has persisted. The appropriate documentation is the official University of Toronto medical certificate (www.utoronto.ca/health/form/medcert.pdf).

Accessibility

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach the course instructor and/or the AccessAbility Services Office as soon as possible. Enquiries are confidential. The UTSC AccessAbility Services staff (located in SW302) are available by appointment to assess your specific needs, provide you with referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca.

Academic integrity policy

According to Section B of the University of Toronto's *Code of Behaviour on Academic Matters*, it is an offence for students to:

- use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- include false, misleading or concocted citations in their work.
- obtain unauthorized assistance on any assignment.
- provide unauthorized assistance to another student. This includes showing another student completed work.
- submit their own work for credit in more than one course without the permission of the instructor
- falsify or alter any documents required by U of T. This includes, but is not limited to, doctor's notes.
- use or possess an unauthorized aid in any test or exam.

Violation of the Code of Behaviour on Academic Matters will force the instructor to provide a written report of the matter to the Chair/DeanProvost's and a penalty according to the U of T's guidelines on sanctions will be put into place.

Submission of paper to Turnitin

Students will be asked to submit their paper to **Turnitin.com** for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site:

(http://www.utoronto.ca/ota/turnitin/ConditionsofUse.html)

Turnitin.com is most effective when it is used by all students; however, if and when students object to its use on principle, the course offers a reasonable offline alternative. You will then be asked to meet with the course instructor to outline and discuss the report before its final submission to demonstrate the process of creating the report according to the academic integrity policy.

Communication policy

Students are required to regularly and often check their UTOR email to receive announcements or updates relating to the course. To inquire about course-related issues, students are strongly encouraged to solely use their UTOR email, as hotmail or other email providers are spam-filtered on a regular basis. It is the responsibility of you as the student to make sure your email reaches the instructor.

The instructor will not answer any questions related to material discussed in class or during the tutorials by email (unless it is a clear yes-no answer), but you are encouraged to ask these questions before or after class or the tutorial, during official office hours or to schedule a meeting outside office hours by email.

Readings

There is no required reading, but most topics introduced in the lectures are covered in the book [Coyne and Orr. 2004. Speciation. Sinauer], which is the recommended course book. The book is available at UTSC's book store (hopefully both new and used books). The course's approach in regard to exam questions is as follows: questions will only cover material introduced in class or labs. If you do not understand certain concepts, the recommended sections of Coyne and Orr's book should be consulted, but anything present in the book yet not covered in the lectures will not be on the exam.

In case a certain topic is not covered in Coyne and Orr's book, the lecture material originated most probably from primary scientific literature. In each such case, there is a reference provided on the slide along with e.g. a table or figure. This reference will help you to find the article using either ISI web of science (with your UTOR ID and password, on the website of the Gerstein library; http://www.library.utoronto.ca/gerstein/) or through Google scholar (does not work in all cases).

Course schedule/Important dates

Week, day, date	Lectures	Activity
1, Mon, 1/6	1/2	Darwin and the Modern Synthesis
1, Wed, 1/8	*No tutorial*	
2, Mon 1/13	3/4	Genetic variation and mutation; Species concepts
2, Wed, 1/15	Tutorial	"How to present in class" Selection of in-class presentation topics
3, Mon, 1/20	5/6	Allopatric and peripatric speciation
3, Wed, 1/22	*No tutorial*	
4, Mon, 1/27	7/8	Parapatric and sympatric speciation
4, Wed, 1/29	*No tutorial*	
5, Mon, 2/3	9/10	Ecological speciation
5, Wed, 2/5	Tutorial	"How to write a good paper"
5, 2/5, in the tutorial	**Choose your paper topic**	
6, Mon, 2/10	11/12	Behavioral and non-ecological speciation
6, Wed, 2/12	Tutorial	"How to make and give a good PPT presentation"
6, Wed, 2/12	**Tutorial**	**Group discussion on speciation model for papers**
Reading week		
7, Mon, 2/24	Q/A	Lectures 1-12
7, Wed, 2/26	**During tutorial time: Midterm exam (lectures 1-12)**	
Sun, 3/1	**Choose your PPT presentation paper**	
8, Mon, 3/2	13/14	Postzygotic speciation
8, Mon, 3/2	**Hand in meiosis quiz to Ivana Stehlik during class**	
8, Wed, 3/4	Tutorial	Student-group based paper-feedback session
8, Sun, 3/8, 11:59pm	**Submit your paper to Quercus**	
9, Mon, 3/9	15/16	Polyploidy and hybrid speciation
9, Wed, 3/11	Tutorial	Student-group based PPT-feedback session
10, Mon, 3/16	17/18	Reinforcement
10, Wed, 3/18	Tutorial	PPT presentations I
10, Sun, 3/22, 11.59 pm	**Quercus quiz due on genetic drift, bottleneck and founder effect**	
11, Mon, 3/23	19/20	Evolution of postzygotic isolation; Importance of selection vs drift
11, Wed, 3/25	Tutorial	PPT presentations II
12, Mon, 3/30	21/22	Adaptive radiation; Diversity through time – extinction
12, Wed, 4/1	Tutorial	PPT presentations III
Apr TBA (exam period)		**Final exam (lectures 1-22)**

Assignments

1. Data paper (written assignment)

Potential topics for papers

The data paper will be on the topic of biogeographical speciation models (allopatric, peripatric, parapatric or sympatric speciation). There are three paper topics to choose from (data paper I, data paper II and data paper III). Please check out the material associated with the three choices in dropbox and email your first choice to ivana.stehlik@utoronto.ca by TBA (see timing in table on page 6 of syllabus). On a first-come-first-serve basis, each topic will be allocated to a third of the class. Stripped-down data sets on biogeographic speciation models form the basis of the papers, which includes data tables and/or figures from a paper, while the source (authorship and text) of the paper will remain undisclosed.

Steps in the paper-writing process

(1) In a first tutorial, you will be provided with in-depth information on how to write a good science paper and what is expected in this particular assignment (see page 6 for timing).

(2) Get access to the ppt file containing a brief outline of the speciation scenarios, the questions involved and the data (figures and tables) provided to answer the outlined question of the paper which is the same for all three data options: what biogeographical speciation model applies to a given scenario and why.

(3) Choose your data set (1, 2 or 3) using task rabbit. If you fail to choose your topic in a timely manner, Ivana Stehlik will choose one for you. If you have a preference with whom to work in the peer feedback group (of ideally 3 students), make sure that between the three of you each student has chosen a different data set (ie student 1 has data set 1, student 2 has data set 2 and student 3 has data set 3). Along with your choice of topics, send an email to Ivana Stehlik ivana.stehlik@utoronto.ca with whom you would like to work together. All non-paired students will be allocated into groups based on the distribution of topics. *Please understand that the perfect allocation of topics and/or peers will not always be possible!*

(4) You will need to consult your lecture notes on the four basic biogeographical speciation models (allopatric, peripatric, parapatric and sympatric speciation) in order to be familiar with what they are and on what basis to distinguish between them. Reviewing this information, look at your stripped-down data set on biogeographic speciation models and decide what speciation model applies and why, without actually writing a draft yet (probably jot down a few helpful notes to help you argue your case in step 7).

(5) In a next tutorial and in your small group, argue verbally what speciation model applies to your data set and check whether the reasonings of your peers on their own speciation models make sense. This already tackles the main question of the assignment. Take notes of helpful comments by your peers to later incorporate into your paper.

(6) In the same tutorial, read over, if necessary complete and agree to the peer group contract outlined further down. You are in this together and you are responsible for the group process.

(7) Using the instructions on how to write the data paper provided in the first tutorial, write a draft of your paper with all needed sections completed and send it to your two peers (Sat, week 7). In turn, you will receive two drafts from your two peers. Note that in the case of incomplete drafts,

our peers will not be able to give you much useful help, thus it is in your own interest to be compliant with the scheduled timing of this assignment.

(8) You will now wear the hat of a peer reviewer to help your peers to increase the quality of their papers for which you will get a maximum of 4% of your final grade, thus do not take this task lightly. By consulting again the instructions on how to write the data paper provided in the first tutorial, carefully read through the two draft papers of your peers and check whether and how well your fellow students have implemented the instructions. *In particular and beyond formatting and writing style, ask yourself whether the structure of the chapters (abstract, introduction, discussion) makes sense, whether you understand the argumentation and whether the argumentation is well enough supported by published literature.* Make notes/comments as you read along. It will probably work best if you insert your comments in the electronic word file using the function 'insert comment' under the header 'Review'. Limit your review process per paper to a max of 1h per paper.

(9) Before coming to the next tutorial, print off the two files with your appended notes as a hard copy and bring them to class.

(10) During the next tutorial and in the group-based, active-learning process, you will provide and receive *verbal* feedback by your two fellow peer students *in a friendly and collaborative approach*. Process: students 2 and 3 will first give their feedback to student 1 on the data set 1, then students 1 and 3 will give feedback to student 2 and then students 1 and 2 will give feedback to student 3. Because the three data sets are different, there is no danger to plagiarize your peers ☺ (the prof thought really hard about this assignment…). In that way, you will be able to learn from feedback provided to a student other than yourself, in a true group-based learning approach! At the end of this tutorial, hand over your hard copy files with the notes to the appropriate students.

(11) You now have one week to implement the suggestions by your peers before submitting your paper to turnitin.

(12) In order to implement the penalties associated with deadlines of the whole paper-writing process where the prof is not involved (receiving the two papers in time the for peer review), please notify Ivana Stehlik by email.

Please refer to the important deadlines in the process of the data paper writing. In this heavily scaffolded assignment, compliance with deadlines is a make or break!!!

Penalties for non-compliance in the paper-writing process

Because this whole peer review process only works if everybody does all steps involved on time, there will be a penalty (agreed up by all members of the group) per day late for any of the deadlines involved with the peer review process (unless you bring a valid doctor's note). This means specifically that if you send in your paper late to your fellow students for peer review, you will get ___% off your final paper mark for each day late (you decide as a group). Also, if you fail to bring feedback comments to the tutorial dedicated to the peer review discussion, you will be penalized by ___ % (you decide as a group) off your final paper mark. Finally, if you fail to send in your final paper to turnitin, you will be penalized 10% per day late, implemented by Ivana Stehlik.

Grading scheme for reports

When writing the report, you should also consider the criteria and grading scheme that will used to evaluate your report.

The maximum number of points a student can reach is 26.

1. **Abstract, title, and key words (4 pts. max)**

Exemplary (A; 2 pts): Title clearly identifies the main question solved. Abstract includes all sections of the paper and is a coherent whole that can be understood. Key words are informative and complement the title.

Accomplished (B; 1.5 pts): Title identifies the project. Abstract does not include all sections of the report. Key words are OK.

Developing (C; 1 pts): Title does not identify the work. Abstract only a listing of facts. Key words could be more informative

Beginning (D; 0.5 pt): Either abstract, title or key words are missing.

Fail (F; 0 pts): Abstract, title and key words are missing.

2. **Introduction (4 pts. max)**

Exemplary (A; 4 pts): Presents the background information and previous work in a concise manner that directly leads into the question(s) being addressed and the purpose of the research.

Accomplished (B; 3 pts): Gives a listing of the facts and previous work but does not tie them together and show how they lead to the purpose of the present work and the questions being addressed. It does have the question(s) being addressed and some purpose for doing them.

Developing (C; 2 pts): Gives very little background or information. May include the question(s) but does not identify their purpose for addressing them.

Beginning (D; 1 pt): Does not include background or previous work does not identify the purpose, the project, or the question(s) being addressed.

Fail (F; 0 pts): No introduction present.

3. **Material and Methods (4 pts. max)**

Exemplary (A; 4 pts): Presents easy to follow steps which are logical and adequately detailed.

Accomplished (B; 3 pts): Most of the steps are understandable; some lack detail or are confusing.

Developing (C; 2 pts): Some of the steps are understandable; most are confusing and lack detail.

Beginning (D; 1 pt): Not sequential, most steps are missing or are confusing.

Fail (F; 0 pts): No Materials and Methods present.

4. Results (4 pts. max)

Exemplary (A; 4 pts): The description of the results is concise and complete. The figures and tables contain all the information needed to understand the data. All the figures and tables flow in a clear and understandable fashion and are referred to in the text. Relevant statistical parameters are provided accurately and completely.

Accomplished (B; 3 pts): Most of the descriptions of the results are complete. Some figures and tables information is missing. The student fails to refer to all figures and tables in the text. The sequence of figures and tables could be improved. Some relevant statistical parameters are missing or wrong.

Developing (C; 2 pts): Many of the results are incomplete, missing or in a wrong sequence. Most relevant statistical parameters are confusing and lack detail. Fails to refer to figures and tables in the text. Figures and tables are missing information.

Beginning (D; 1 pt): Figures and tables inaccurate or wrong. Figure or table are missing. Does not provide any relevant statistical evidence.

Fail (F; 0 pts): No Results present.

5. Discussion (4 pts. max)

Exemplary (A; 4 pts): Presents a logical explanation for findings and addresses the questions. Additionally, suggests what the next experiments would be. Refers to relevant figures and tables.

Accomplished (B; 3 pts): Presents a logical explanation for findings and addresses some of the questions. Fails to refer to all relevant figures or tables.

Developing (C; 2 pts): Presents an illogical explanation for findings and addresses a few questions. Fails to refer to relevant figures and tables.

Beginning (D; 1 pt): Presents illogical explanations for findings and does not address any of the questions suggested in the introduction.

Fail (E; 0 pts): No Discussion present.

6. Clarity (4 pts. max)

Exemplary (A; 4 pts): The paper is easy to read and flows expertly. Language is sophisticated without being jargonistic. Terms of analysis and argumentation are clearly laid out and well-defined.

Accomplished (B; 3 pts): The paper is well written but suffers from some significant grammatical inconsistencies or spelling errors. Language is clear but lacks scholarly depth. There are some lapses in definition and explication of terms. Segue between points in the analysis are weak.

Developing (C; 2 pts): There are significant but not quite major problems in grammar and spelling. Language is unclear and/or shallow. Terms are not well defined and analysis leaps erratically from point to point.

Beginning (D; 1 pt): Major problems with grammar and spelling. Language is murky, confused and difficult to follow. There is a paucity of definitions or context for analysis.

Fail (F; 0 pts): Language is sub-par for university, riddled with grammatical and spelling errors. The argumentation is difficult to follow and lacks any sense of flow.

7. Format (2 pts. max)

Exemplary (A; 2 pts): A cover page provides pertinent information. The bibliography follows a recognized scholarly style. Citations are thorough and well documented throughout the paper.

Accomplished (B; 1.5 pts): Citations and bibliography are solid but not thorough, with some noticeable omissions.

Developing (C; 1 pt): Citations are weak and/or the bibliography is incomplete.

Beginning (D; 0.5 pt): There are next to no citations and/or no bibliography or it does not follow a scholarly style.

Fail (F; 0 pts): The paper does not follow a scholarly format.

Example of contract between group members to diminish likelihood of free-loading

A contract might not be necessary if you work with your best friends, but is probably a good idea when working in a group with members you don't really know. The wording below is just a suggestion, so feel free to modify and complete it as a group. This contract can also be found in our course dropbox: modify if needed, print off and sign.

Rules for the data paper assignment

I hereby agree that I will do all that is needed to participate fully as a group member to give and receive feedback on the data paper to the best of my abilities.

In particular, I will…

☐ send the draft of my paper to my peer reviewers on time (timing see table on page 6 in the syllabus); deduction for non-compliance: __% (choose as a group) on the final mark for this assignment

☐ provide critical feedback to my reviewees to the best of my abilities, taking into account the rules and suggestions as provided by Ivana Stehlik in the 'how to write a good scientific paper' tutorial (re-visit them!); deduction for non-compliance: __% (choose as a group) on the final mark for this assignment

☐ be present in the paper feedback tutorial to participate as a group in the giving and receiving of the feedback; deduction for non-compliance: __% (choose as a group) on the final mark for this assignment

☐ give critical feedback in a polite and helpful way

☐ receive feedback graciously and without taking personal offense

☐ _____

☐ _____

I accept that by violating this contract I will face a decrease of my mark for this assignment ([composite] penalty specified above).

Group member 1, signature: _____

Group member 2, signature: _____

Group member 3, signature: _____

2. In-class presentations of lecture material (group-based presentations)

In order to allow or force you (you decide on the twist ☺) to engage more deeply with the lecture material, each student will present, *in a group-based approach, selected lecture slides during regular class time in which normally just the prof yaks*. There will be four (maybe five) such double lectures with student participation. Similarly as for the material presented by the prof, you will be responsible for allowing your listening class mates to go along your presentation in an appropriate lecturing speed to understand your selected material. Your presentation which will form the basis for the exam(s)…

In your group of (2) 4 to 6 students (depending on final class size), you will present between 6 and 16 slides, broken down into subtopics and student subgroups. The slides are provided by the prof using her signature design, contents and flow to fit the rest of the lectures to which the particular student-presented slides belong and where the prof will present the rest of the slides. In other words, you will not have to prepare any slide material, but you are allowed, within reason, to modify individual slides to make them better suit your presentation styles if needed (but do not ramp up words counts!).

The typical procedure of a given lecture with student participation is as following: the prof starts by giving lecture outlines and an introduction to a topic. She will then hand over to a student (sub-) group. The prof will then supervise clarifying questions by the audience to the student subgroup and summarize a particular student lecture section. She will then continue in the lecture and hand over again when necessary to the next student subgroup. The aim of this exercise is to provide as seamless as possible a lecture flow between the prof and the well-prepared students ☺.

Steps in the in-class presentation process

(1) In a first tutorial, the prof will provide you with in-depth information on what is expected from you in your in-class presentations (see page 6 for timing). In this tutorial, there will be a semi-randomized selection process for when (and hence what) you will present and with who. Please see the presentation topics and associated dates below. *In this tutorial, exchange student names and contact info to be able to organize all later steps.*

(2) In our class dropbox, find the prof-prepared slides and pdfs for the associated chapters of our non-mandatory course book (Coyne and Orr. 2004. Speciation).

(3) Each member of a given group should read this chapter on their own to know what the broad topic and specific slides are about. Most slide examples are mentioned/explained in the book.

(4) The group should meet (outside class or tutorial time: organize yourself!) and decide which students will form a specific subgroup to tackle a specific subtopic (see my suggested student group partitioning and subtopics below). Make sure that each student presents at least one slide.

(5) Each (sub) group should now prepare their specific slides by either referring to Coyne and Orr or, for those examples not taken from the book, to the referenced papers (read through the abstract and superficially scan-read the paper to understand what a figure or table is about).

(6) Meet again and practice presenting your subtopics to each other (outside class or tutorial time: organize yourself!). The group members wearing the audience hat should make sure they can follow and understand what the presenters talk about. This is a group-learning exercise, thus provide helpful feedback on all important presentation matters. Don't forget, you are responsible that your in-class audience gets what particular slides are about!

(7) If necessary, send your modified slides to the prof for incorporation in her lecture (at least one day before class).

Dates, topics and suggested breakdown of student groups into subgroups

(1) Group 1 (6 students): lecture 5/6

Presentation day: week 3

-1 Isthmus of Panama slides: 9 slides

-2 Flora of E Asia and Eastern North America: 5 slides

-3 Phylogeography slides and Ring species: 6 slides

-4 Islands and stickleback slides: 6 slides

-5 Speciation on archipelagos: 5 slides

(2) Group 2 (6 students): lecture 7/8

Presentation day: week 4

-1 Dichelopa on Easter Island: 7 slides

-2 Three-spine stickleback in BC: 8 slides

-3 Lake Barombi fish: 7 slides

(3) Group 3 (6 students): lecture 9/10

Presentation day: week 5

-1 Pollinator isolation - symbiotic & parasitic: 8 slides

-2 Temporal isolation - Gelsemium, corals: 8 slides

-3 Temporal isolation - Japanese moth: 5 slides

-4 Temporal isolation – Monkeyflower: 4 slides

(4) Group 4 (2 students): lecture 11-12

Presentation day: week 6

-1 Isolation visual - cichlids: 5 slides

-2 Isolation auditory – warbler: 4 slides

-3 Isolation through sent – snakes: 4 slides

[(5) Group 5 (2 students): lecture 17-18] NOT FOR 2017

Presentation day: week 10

-Reinforcement: 2 students

Please refer to the table on page 6 in the syllabus for important deadlines in the process of thePPT production process.

3. PPT presentation of the scientific paper (individual students)

You will be required to present a PPT talk to the class based on one primary literature paper, thus a scientific study (i.e. not a review). Topics cover extrinsic and intrinsic postzygotic isolation for the presentation session I and polyploidy & hybrid speciation, reinforcement and adaptive radiation for the presentation session II. A third of the class will present during session I, another third during session II and the last third during session III (see p. 6 for specific presentation dates). Please find a list of suggested papers below. You must sign up for a paper and, hence, presentation date by sending an email of your top three choices to Ivana Stehlik and topics will be allocated on a first-come-first-served basis (exact deadline see table on p. 6). You may choose your own paper compatible with topics covered in class, i.e. papers other than those listed below if you prefer, but these must be approved by Ivana Stehlik.

Presentation goals

Presentations should be 10 min long (plus 2 min for Q & A), and should fulfill three main goals:
(*i*) Bring the whole class 'up to speed' on the hypotheses, procedures and conclusions of the study. In order to do this, you will need to fill in background information which is unlikely to be common student knowledge. This may require consulting sources other than just your chosen paper.
(*ii*) Highlight where the paper links to theory and general principals of evolutionary biology and the field of speciation.
(*iii*) Answer potential audience questions.

Steps in the PPT presentation process

(1) Choose your *three papers* and send in your 1st, 2nd and 3rd choice to Ivana Stehlik (see page 6 for timing). Please note that *these three choices must be from three different speciation subchapters* (see below). The prof will make sure that all speciation chapters are represented appropriately while taking into account to accommodate your 1st or 2nd choices.

(2) In a tutorial, you will be provided with in-depth information on prepare and give a good PPT presentation and what is expected in this particular assignment (see page 6 for timing).

(3) Reviewing this information, produce a draft of your complete PPT presentation.

(4) In a next tutorial, bring your laptop with your presentation and present it to two peers in a small group feedback process. Work in the same group as for the paper assignment. Talk your peers through your PPT, receive and give feedback much like during the peer feedback session on the data paper. Again, you will have the ability to learn from comments directed to somebody else than you, thus be attentive! Similarly as in the paper feedback sessions, the more complete your draft PPT is and the more you know what you are going to say in which slide, the better the feedback your peers can give you. *When wearing the hat of a peer reviewer, ask yourself whether (1) you understand the overarching story of your reviewee, (2) the flow of the presentation makes sense, (3) your reviewee uses the appropriate level of scientific lingo (simple but not simplistic) and (4) the slides look clean and appropriately formatted.* Give and provide feedback in a friendly and collaborative manner to the best of your abilities! As a reviewee, takes notes to incorporate them into the final version of you PPT presentation.

(5) Work in the comments by your peers; you will have at least one week to do that.

(6) On the PPT presentation day, bring a memory stick with your file on it to upload onto the course computer. If you are a mac user, convert your ppt presentation into a pdf to avoid file incompatibility and distortion of your layout.

(7) Present in class. As a member of an active audience, you should not just lean back and take a nap… The role of the audience is to provide an attentive, receptive, but critical response to the material presented. Each student will be allocated a specific role to provide feedback, ie (1) on the construction of the presentation or logical flow, (2) slide quality and layout, (3) on oral presentation skills and non-verbal communication. You will act out the three different feedback roles on the three different presentation sessions (I – III). Your feedback will be given to the presenter.

Please refer to the table on page 6 in the syllabus for important deadlines in the process of thePPT production process. Again, compliance with deadlines is a make or break!!!

Potential topics for presentations; session I (*plant paper; #animal paper)

- **Extrinsic postzygotic isolation:**

#- Kuwajima M., Kobayashi N. and Katakura H. 2010. Detection of ecological hybrid inviability in a pair of sympatric phytophagous ladybird beetles (*Henosepilachna* spp.). Entomologia Experimentalis et Applicata 134: 280-286.

*- Leotard G., Saltmarsh A., Kjellberg F. and Mckey D. 2008. Mutualism, hybrid inviability and speciation in a tropical ant-plant. Journal of Evolutionary Biology 21: 1133-1143.

#- Veen T., Svedin N., Forsman J.T., Hjernquist M.B., Qvarnstrom A., Hjernquist K.A.T., Traff J. and Klaassen M. 2007. Does migration of hybrids contribute to post-zygotic isolation in flycatchers? Proceedings of the Royal Society B 274: 707-712.

- **Intrinsic postzygotic isolation:**

#-Bono J.M. and Markow T.A. 2009. Post-zygotic isolation in cactophilic *Drosophila*: larval viability and adult life-history traits of *D-mojavensis*/*D-arizonae* hybrids. Journal of Evolutionary Biology 22: 1387-1395.

#- Bronson C.L., Grubb T.C., Sattler G.D. and Braun M.J. 2005. Reproductive success across the black-capped Chickadee (*Poecile atricapillus*) and Carolina Chickadee (*P. carolinensis*) hybrid zone in Ohio. AUK 122: 759-772.

*-Brothers A.N. and Delph L.F. 2010. Haldane's rule is extended to plants with sex chromosomes. Evolution 64: 3643-3648.

#-Christianson S.J., Swallow J.G. and Wilkinson G.S. 2005. Rapid evolution of postzygotic reproductive isolation in stalk-eyed flies. Evolution 59: 849-857.

#- Lijtmaer D.A., Mahler B. and Tubaro P.L. 2003. Hybridization and postzygotic isolation patterns in pigeons and doves. Evolution 57: 1411-1418.

#- Matute D.R. and Coyne J.A. 2010. Intrinsic reproductive isolation between two sister species of *Drosophila*. Evolution 64: 903-920.

#- Presgraves D.C. 2002. Patterns of postzygotic isolation in Lepidoptera. Evolution 56: 1168-1183.

#-Pryke S. R. and Griffith S.C. 2009. Postzygotic genetic incompatibility between sympatric color morphs. Evolution 63: 793-798.

*- Scopece G., Widmer A. and Cozzolino S. 2008. Evolution of postzygotic reproductive isolation in a guild of deceptive orchids. American Naturalist 171: 315-326.

#- Takahashi H., Nagai T. and Goto A. 2005. Hybrid male sterility between the fresh- and brackish-water types of ninespine stickelback *Pungitius pungitius* (Pisces, Gasterodeidae). Zoological Science 22: 35-40.

#- Tech C. 2006. Postzygotic incompatibilities between the pupfishes, *Cyprinodon elegans* and *Cyprinodon variegatus*: hybrid sterility and sex ratio bias. Journal of Evolutionary Biology 19: 1830-1837.

Potential topics for presentations; session II (*plant paper; #animal paper)

- **Polyploid and hybrid speciation:**

*- Cook L.M., Soltis P.S., Brunsfeld S.J. and Soltis D.E. 1998. Multiple independent formations of *Tragopogon* tetraploids (Asteraceae): evidence from RAPD markers. Molecular Ecology 7: 1293-1302.

*-Perrie L.R., Shepherd L.D., De Lange P.J. and Brownsey P.J. 2010. Parallel polyploid speciation: distinct sympatric gene-pools of recurrently derived allo-octoploid *Asplenium* ferns. Molecular Ecology 19: 2916-2932.

#- Ptacek M.B., Gerhardt H.C. and Sage R.D. 1994. Multiple origins of the tetraploid, *Hyla versicolor*. Evolution 48: 898-908.

*- Slotte T., Huang H.R., Lascoux M. ad Ceplitis A. 2008. Polyploid speciation did not confer instant reproductive isolation in *Capsella* (Brassicaceae). Molecular Biology and Evolution 25: 1472-1481.

*- Ramsey J. 2007. Unreduced gametes and neopolyploids in natural populations of *Achillea borealis* (Asteraceae). Heredity 98: 143-150.

- **Reinforcement:**

#-Cooley J.R., Simon c. and Marshall D.C. 2003. Temporal separation and speciation in periodical cicadas. BioScience 53: 151-157.

#- Hoskin C.J., Higgie M., McDonald K.R. and Moritz C. 2005. Reinforcement drives rapid allopatric speciation. Nature 437: 1353-1356.

#-Kameda Y., Kawakita A. and Makoto K. 2009. Reproductive character displacement in genital morphology in Satsuma land snails. American Naturalist 173: 689-697.

*-Kay and Schemske. 2008. Natural selection reinforces speciation in a radiation of neotropical rainforest plants. Evolution 62: 2628-2642.

#-Lemmon E.M. and Lemmon A.R. 2010. Reinforcement in chorus frogs: lifetime fitness estimates including intrinsic natural selection and sexual selection against hybrids. Evolution 64: 1748-1761.

#-Mullen s.P. and Andres J.A. 2007. Rapid evolution of sexual signals in sympatric Calopteryx damselflies: reinforcement or 'noisy-neighbour' ecological character displacement? Journal of Evolutionary Biology 20: 1637-1648.

*-Yost J.M. and Kay K.M. 2009. The evolution of postpollination reproductive isolation in *Costus*. Sexual Plant Reproduction 22: 247-255.

- **Adaptive radiation:**

*-Agrawal A.A., Fishbein M., Halitschke R., Hastings A.P., Rabosky D.L. and Rasmann S. 2009. Evidence for adaptive radiation from a phylogenetic study of plant defenses. Proceedings of the National Academy of Sciences of the United States 106: 18067-18072.

#-Givnish T.J., Millam K.C., Mast A.R., Paterson T.B., Theim T.J., Hipp A.L., Henss J.M., Smith J.F., Wood K.R. and Sytsma K.J. 2009. Origin, adaptive radiation and diversification of the Hawaiian lobeliads (Asterales: Campanulaceae). Proceedings of the Royal Society B 276: 407-416.
#-Joy J.B. and Crespi B.J. 2007. Adaptive radiation of gall-inducing insects within a single host-plant species. Evolution 61: 784-795.
#-Lengyel S., Gove A.D., Latimer A.M., Majer J.D., Dunn R.R. 2009. Ants sow the seeds of global diversification in flowering plants. PLoS ONE 4: e5480.
#-Losos J.B., Warheit K.I. and Schoener T.W. 1997. Adaptive differentiation following experimental island colonization in *Anolis* lizards. Nature 387:70-73.
#-Matschiner M., Hanel R. and Salzburger W. 2011. On the origin and trigger of the notothenioid adaptive radiation. PLOS One 6: e18911.
#-von Rintelen K, Glaubrecht M. Schubart C.D., Wessel A. and von Rintelen T. 2010. Adaptive radiation and ecological diversification of Sulawesi's ancient lake shrimps. Evolution 64: 3278-3299.