IB 181: Paleobotany:
The 500-million year history of a greening planet
(3 units)
—— Course Summary and Syllabus ——

<table>
<thead>
<tr>
<th>Location:</th>
<th>3003 VLSB</th>
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<tbody>
<tr>
<td>Lecture:</td>
<td>Mondays: 2:00-4:00pm</td>
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<tr>
<td>Discussion &amp; Lab sections:</td>
<td>Wednesday/Thursday: 1:00-3:00pm</td>
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Basic information

Instructor: Cindy V. Looy
Instructor e-mail: looy@berkeley.edu
(Please include "IB181" in subject line)

Instructor office hours: Wednesday 9:00-11:00am in 4101 VLSB

GSI: Jeff Benca
GSI e-mail: jbenca@berkeley.edu
(Please include "IB181" in subject)

GSI office hours: Friday, 1:30-3:30pm in 3003 VLSB

Note: When you are enrolled in this course, a tab for this course will be added to your personal bSpace account. Make sure the IB 181 tab is active, if the tab for this course does not appear on your bSpace site, go to 'My Workspace' then click 'Preferences' and add IB 181 to your active tabs. Here you will find this syllabus and a forum, where you can share your ideas and thoughts with fellow students.

Course description

This course is an introduction to the evolution of plants and their ecosystems through time. We will start off with the earliest plant life, the transition to land, and the emergence of terrestrial ecosystems. We will follow the evolution of major plant groups during important moments in time through the Phanerozoic (last 540 million years). We will explore ancient fossilized plant communities, their ecological properties, and examine how major environmental upheavals affected their evolution. Throughout the course, we will see what profound impact plants have on the functioning of our planet’s surface and atmosphere.

Primary text: Required


Course Policies

Grading breakdown:
One midterm, (material from Part I): 25%
One final exam, (material from Part II): 35%
Discussion and lab section performance: 20%

(1/2 credits = presentation; 1/2 credits = audience feedback)

Two debates: 10%
Weekly pre-lab/lecture assignments: 10%

Grading

This course will NOT be graded on a curve.

Regrades

If you feel that we have made a mistake in grading your exam, you may only submit it for a regrade to the GSI three days after the exam has been returned to you. Likewise, if you do not submit your exam within one week after it was given back to you, the GSI will not regrade unless under special circumstances (e.g. doctor’s note). Be aware that regrades can sometimes result in point deductions as well.

Midterms and Final

Exams will be mostly short-answer. The Midterm will cover topics in lecture, discussion, debate, lab exercises, and class readings during Part I of the course. The Final will cover topics in lecture, discussion, debate, lab exercises, and class readings during Part II of the course. So, the final is not “cumulative;” however, you will need to understand foundational concepts from Part I of the course to understand material in Part II.

Attendance and class participation

Attendance is highly recommended for all lectures and required for lab/discussion sections. You will be graded on participation and will need to partake in the discussions to receive credit.

If you must be absent due to a family emergency or illness, please contact the instructor and GSI as soon as possible.
Classroom etiquette —

As UC Berkeley students, you are expected to comply with this institution's standards of academic integrity and honesty and behave in manner that does not diminish the learning atmosphere of your classroom.

No cell phone use during class. If the instructor or GSI sees you texting/chatting/etc. on your computer/tablet/phone, points will be deducted for class participation!

Missed exams and missed or late assignments

are expected to take all exams at their scheduled date and time. How we deal with missed exams and missed or late assignment will be decided on an individual basis by the instructor. If you are going to miss an exam, contact the instructor in advance. When you have missed exam or assignment it is up to you to contact the instructor about this.

Reporting illness and family emergencies

If illness or a family emergency does prevent you from attending class, attending section or making an exam, we will require written proof of the situation.

Extra credit opportunities

No extra credit opportunities are offered for this class.

Permissible and impermissible collaboration & academic honesty —

Academic honesty violations as outlined below are grounds for an F in this course.

Permissible collaboration: You will be working frequently groups this semester in both lecture and lab. In lab, you will be required to work in a group to present a discussion paper (you will evaluate and grade your peers' participation for these presentation projects). You will also be working in debate "teams" for the two lab debates. In addition, partaking in study groups outside of class for the MIDTERM and FINAL is permitted and encouraged.

Impermissible collaboration and cheating:

Unpermitted discussion or collaboration with peers on non-course materials (e.g. pre-lecture quizzes, taking exams, influencing each-others' grading of peers during lab section) is unacceptable and will result in an F for this course. Cheating in any form will automatically result in an F for the course as well.

Plagiarism:

If you use information or an idea in any activity relating to this course that is not your own, (i.e. there is literature in existence that suggests you were not the first being on this planet to think of an idea) you must cite and acknowledge the primary source of that idea or information. There are exceptions that exist: "common knowledge" (e.g. there are 24hrs in a day, the sky is blue). However, be very careful making this judgment call; if you ever are ever in doubt, cite! Also: You must cite the resources for photos, figures, and tables that are not your own used in your powerpoints.

If you have questions on whether or not to cite a specific fact or information or are not comfortable wth of guidelines, email the GSI or contact the Student Learning Center for assistance. REMEMBER: NOT CITING A PRIMARY WORK IS PLAGIARISM!!

Discussion and Lab Structure

Labs in this course are designed to achieve three objectives:

1) Equip you with hands-on experience in observing and interpreting both fossil and living plants to complement lecture materials

2) Provide opportunities to work in teams and present your evaluations of a scientific paper and evaluate your peers' presentations.

3) Give chances to think critically and (as a team) advocate a position regarding major controversies in paleobotany/palaeoecology via two subject debates:

   I. What really caused the End-Permian Ecological Crisis?

   II. The origin and diversification of Angiosperms (flowering plants).

Typical discussion and lab itinerary:

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tr>
<td>1:00-1:10pm</td>
<td>Arrive and prepare for presentation</td>
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<tr>
<td>1:10-1:25pm</td>
<td>Discussion paper group presentation</td>
</tr>
<tr>
<td>1:25-1:35pm</td>
<td>Questions/student grading</td>
</tr>
<tr>
<td>1:35-1:45pm</td>
<td>Lab introduction</td>
</tr>
<tr>
<td>1:45-2:50pm</td>
<td>Lab exercise/fossil observation</td>
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<tr>
<td>2:50-3:00pm</td>
<td>Discuss lab exercise questions</td>
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Discussion and Lab Components

Discussion paper presentations:

During the first lab, students will be broken up into pairs and assigned one discussion reading for the semester, which they will read, organize a PowerPoint presentation, and present to the class during the beginning of lab.

Duties:

Presenter duties — Presentations will be no longer than 15 minutes in length and each person must speak for half this time (7.5 minutes). You must read the entire paper you are assigned to present, then divide the following sections equally between you and your partner to cover during the presentation:

1) Introduction
2) Materials/Methods
3) Key Results
4) Discussion/Conclusion
In addition to preparing, you will need to write a 10-15 minute paper for each paper the class regarding key changes and how they impact our view of paleobotany. Exam questions will touch upon what you have taken from these papers so remember that you are providing the exam material for your peers.

**NOTE: YOU MUST BRING YOUR OWN ADAPTER CABLE IF YOU ARE PRESENTING FROM A MAC!** The projector hooks into a Windows® computer so it is your responsibility to come prepared if your presentation is on a Mac.

**Audience duties** — If you are not presenting, you have these tasks:

1. After the presentation, write in your own words why the discussion paper presented was significant to the study of paleobotany/paleoecology. How does the study contribute to the ‘big picture’?
   
   You will grade the presentation via a rubric you will receive in lab.

2. Ask questions after the presentation. Is there anything you don’t understand?

**Lab exercises**

We will supply you with the lab exercises at the beginning of lab. These exercises are not graded but will form the basis of you notes for the exam and final, so it will be to your benefit to understand everything on these lab handouts after coming out of lab. Lab exercises will provide a list of short-answer questions.

**Pre-Lecture/pre-discussion quizzes**

Every Saturday you will have a pre-lecture/pre-lab quiz posted on b-Space with several short-answer questions from all of your assigned readings that week. These quizzes will be available from Saturday morning (afternoon) to Tuesday night (11:59pm). These questions are a significant source of points for your grade so do not treat them lightly. **DO YOUR READING AHEAD OF TIME** (get it done by Saturday afternoon.) Take good notes on key concepts and findings of your papers as you read. The quizzes are open-note but are also good practice for those on the midterm and final.

**Debates**

There will be two debates in the Discussion and Lab section. You will be broken up into several groups and each group will be assigned a paper proposing a stance on the subject. In the discussion section you will discuss the paper’s strengths and weaknesses with your team and you will decide whether you would support your paper or not. Then as a team, you will use your paper’s position to debate with teams assigned other papers.

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**IB 181 Paleobotany - the 500-million year history of a greening planet - Weekly schedule**

**Week**  | **Lecture and discussion and lab topics**

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1 | **Aug 27**
   1) Fossil plant preservation
   2) The paleobotanical toolbox
   Discussion and lab - Preservation

2 | **Sep 3**
   Academic Holiday
   Discussion and lab - Plant tissue types and morphology

3 | **Sept 10**
   3) Earliest plant life
   4) The transition to land
   Discussion and lab - Early land plants and algae

4 | **Sept 17**
   5) Emerging terrestrial ecosystems
   6) A frozen ecosystem - the Early Devonian Rhynie Chert
   Discussion and lab - Rhynie Chert

5 | **Sept 24**
   7) Silurian and Devonian innovations - leaves and size
   8) Silurian and Devonian innovations - heterospory and seeds
   Discussion and lab - Key Evolutionary Innovations
Oct 1  9) Paleozoic puzzles. *Prototaxites*
    10) Paleozoic puzzles - Local examples
    Discussion and lab - Review session

Oct 8  11) The Late Carboniferous coal swamps
    12) The Permian rise of gymnosperms
    Tuesday Oct 9, 5:00-7:00PM: Mid Term Exam
    Discussion and lab - Coal ball peels

Oct 15 13) The end-Permian biotic crisis
    14) Early Triassic survival and recovery
    Discussion and debate - Do plants dance to a different beat?

Oct 22 15) Mesozoic ecosystems
    16) Mesozoic seed plant relationships
    Discussion and lab - Seed plant phylogeny

Oct 29 17) The origin of flowering plants
    18) Angiosperm-insect pollination and the fossil record
    Discussion and debate - Angiosperm success stories

    aftermath
    20) Plants as paleoclimate and paleoatmosphere indicators
    Discussion and lab - Reconstruction paleoclimate and atmosphere

Nov 12: Academic Holiday
    Discussion and lab - Plant-insect interaction

Nov 19 21) The Paleocene-Eocene biotic response to a global warming event
    22) The rise and demise of polar Forests
    Discussion and lab - Thanksgiving Break
24) Quaternary climatic fluctuations and plant migration patterns 
Discussion and lab - Novel climates and no-analog communities

15
Dec 3 27) Review
28) Q&A
Discussion, debate and lab – Review discussion and labs

16
Thursday Dec 16, 3:00-6:00PM: Final Exam

Class and Discussion Reading

Red = Class reading
Blue = Discussion reading

Week 1 – Fossils and preservation
Bennington JB, DiMichele WA, Badgley C, Bambach RK, Barrett PM, Behrensmeyer AK, Boege R,
Burnham RJ, Daeschler EB, Van Dam J, Erden JT, Erwin DH, Finneghan S, Holland SM, Hunt G, Jablonski D,
issues of scale in paleoecology. PALAIOS 24: 1-4.

plants are formed. In: Paleobotany - The biology and evolution of fossil plants. Academic
Press, Amsterdam, pp 1-42.

Week 2 - Plant tissue types and morphology
and anatomy. In: Paleobotany - The biology and evolution of fossil plants. Academic Press, Amsterdam, pp 201-
222.

Week 3 - Early land plants and algae


Week 4 - Rhynie Chert


Week 5 - Key Evolutionary Innovations


Week 6 - Review session

No Readings

Week 7 - Carboniferous coal ball peats


Week 8 - Do plants dance to a different beat?


DEBATE: What caused the End-Permian Ecological Crisis?

Week 9 - Seed plant phylogeny


Week 10 - Angiosperm success stories


DEBATE: Angiosperm origins and diversification

Week 11 - Reconstruction paleoclimate and atmosphere


Week 12 - Plant-insect interaction


Week 13 - Thanksgiving Break

No Discussion & Lab section, No readings

Week 14 - Novel climates and no-analog communities
