Biological Literature and Communication

The University of Toledo
College of Natural Sciences and Mathematics
Department of Biological Sciences

BIOL 4700-001 (Biol Lit and Comm-WAC)

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Term: Spring 2015
Class location: BO 1099 for the first three classes
WH 1240 for the rest of the semester
Class location: Tuesday and Thursday 11-12:15
Credit Hours: 3 Credits
Website: https://blackboard.utdl.edu/webapps/login/
2015:1, BIOL4700:001 Biol Lit and Comm-WAC

COURSE CATALOG DESCRIPTION

A writing intensive course that focuses on reading original literature in biology in a variety of formats. Required of all biology majors.

COURSE DESCRIPTION

Welcome to *Biological Literature and Communication* and I hope you will find this enriching. This is a capstone course. It provides students the opportunity to demonstrate that they have achieved the learning goals of biology majors at the highest levels (see Bloom's Taxonomy). The goal of this course is to give you the skills needed to evaluate scientific work and express a well-supported opinion in a concise manner. This course focuses on constructive and critical reading of original research papers, and aspires to mimic the various ways scientists discuss submitted scientific work and proposals. To accomplish this, you will read primary literature, discuss article content in class and in study groups, and formulate your own supported opinion about the results and interpretations put forth by the authors. You will present your opinion both in writing and verbally, and provide peer reviews for your classmates' work.

Be advised that this is an intensive Writing Across the Curriculum (WAC) course (see below for details) that includes writing, presenting, peer review, and a large amount of team and independent work. ***I do not recommend taking more than one WAC course per semester.***

STUDENT LEARNING OUTCOMES

Upon completion of this course, the student will be able to:
1) Understand and analyze primary scientific literature and use critical thinking to evaluate it.
2) Express thoughts scientifically, clearly, and in concise manner, both verbally and in writing.
3) Work collaboratively to present scientific literature.
4) Use and provide effective peer review for the presentation of scientific findings.

PREREQUISITES AND COREQUISITES

BIOL 3030 for level UG with minimum grade of C.

TEACHING STRATEGIES

This in an interactive course – both the instructor and students will lead discussions with the class. At the beginning of the course, the instructor provides general introduction. Students are required to search for additional literature and to read supplemental materials to ensure that they understand the background, methods used, etc.

To allow for in-depth understanding and critical reading, all of the papers discussed are related to a particular topic of clinical and scientific significance. Each paper is dissected carefully over several class periods.

The course syllabus provides you with the expectations for this course. The syllabus is subject to change during the semester to address specific issues that come up during the course. Make sure you bring the most recent copy of the syllabus to all classes.

A typical class involves:

1) Before each class, students will read a paper and write a short 150 words report on the paper (see formatting instructions below).

2) Before each class, a team of students will work together to understand the paper and then present the paper to the rest of the class.

3) Each class starts with a short clicker quiz composed of a few multiple choice questions intended to assess student preparation for class.

4) The class itself involves activities such as students presenting papers and class discussions of the paper contents.

4) At the end of each class, each student assesses his or her own participation in class.

COURSE EXPECTATIONS

Writing Assignment Format

Remember, scientific writing should always be simple, clear, and concise.

General text formatting

Each assignment must be on 1 page not more. Use the font Arial, 12 pt, page margins are 1 inch with single line spacing. Justify paragraphs, and do not indent at the beginning of a paragraph, instead, add a space of 6 points before a paragraph. In case of assignment with multiple paragraphs, keep each paragraph on one page - do not have paragraphs separate over a page break. For that use MS Word: "Keep With Next" and "Keep Lines Together" functions (do not add empty lines to group paragraphs). The menu to a space before the paragraph and to keep paragraphs together is found in the Format menu: click Paragraph, and then click the Line and Page Breaks tab or Line and Page Breaks tab. Make sure that a line of text does not have only a single word in it by "de-orphaning" the last word in a line using hard space **(CTRL+ENTER in PC, or Shift+Option+ENTER in Mac).** In general, paragraphs should not be longer than 1/3 of a page. ***Grades will be reduced by 10% if these formatting aspects are not followed precisely***.

Sentence highlights

In all assignments, in every sentence, highlight the subject by Double Underline (CTRL+SHIFT+D in PC or COMMAND+SHIFT+D in Mac) and the verb by a single Underline (CTRL+U in PC or COMMAND+U in Mac). In each sentence highlight the topic section in bold and the stress section in italics. ***Grades will be reduced by additional 10% if these aspects of formatting are not followed precisely.***

Paragraph/summary highlights

A paragraph describing a scientific finding has 7 elements. Please highlight each of the above elements with a distinct color as below.

1. Background - What is known abut the subject? Why is this important? (Plain black no highlight)
2. **Question - What is not known? How significant is this question? (**bold and Green)
3. Hypothesis - What is the author's hypothesis? What is the basis of this hypothesis? Is it significant? (Red)
4. Method – What was the general approach used and its advantages? (Blue)
5. Results - What did the authors find? (Plain black no highlight)
6. **Conclusion/Outcome - What is the author's interpretation? (**bold and Green)
7. Future direction - What can be achieved next that was not possible before? (Red)

General Writing instruction

- When writing you must provide information that backs up and explains the rationale for your statement.
- In the hypothesis section use the word hypothesis, not "believe", "theory", "idea", or others
- In the method section do not simply name the method used. You need to conceptualize them and explain their purpose. This requires you to understand the method in general and how it is used in the paper.

Uploading and hard copy

Assignments can be uploaded more than once if there is a justified need. However, I will only grade the first assignment if no detailed explanation is provided as to why there was a need to submit an assignment more than once. A hard copy of each assignment must be brought to class.

GRADING

Final Grading
Students who do not attend class regularly, stop attending at some point throughout the semester, or missed more then 6 classes will be given a final grade of "F" which will impact your overall grade point average. Since this course is required for biology majors having "F" will deny you from receiving BSc. To formally withdraw from this or any other course you need to contact the Registrar's Office.

The grading scale for this course is as follows:

A	100-94%	A-	93-90%	B+	90-87%	B	87-84%	B-	83-80%
C+	80-77%	C	77-74%	C-	73-70%	D+	70-67%	D	67-64%
D-	63-60%	F	60-0%.						

Grades will be determined based on 6 factors with an approximate weight as follows (The instructor may change these weights at any time during the course to ensure the students achieve the course goals):

Pre and post-class assignments:	20%	Clicker questions:	10-20%
Class participation:	10%	Team work and Peer Reviews:	10%
Midterm exam/paper (optional)	0-10%	Oral Presentations:	20%
Term exam/paper:	20%	Total:	100%

Mid-term exam/paper
Unlike the rest of the class activities and assignments, the midterm exam/paper represents the work of the student, and help from others is not permitted at any stage of its preparation. The midterm paper must be submitted by midnight of the indicated due day. The midterm exam is an open book exam and you can bring with you any information you feel is appropriate to help you with this assighment. The midterm paper will be identical to the 1 page, 150-word summary written prior to class. The paper topic for this year will be announced during the exam.

Final Term Paper:
Like the mid-term exam/paper the final term paper represents the work of the student, and help from others is not permitted at any stage of its preparation. The term paper must be submitted by the end of the semester on May 01, 2015 at midnight.

The term paper will mimic the general text format of the pre-class assignments. The paper topic for this year will be announced later.

After acquiring the topic, your first aim should be to get a copy of the paper's main text and supplementary data by searching the Internet via PubMed.

Then, in the term paper, using 600 words (not more), address the points below:

1_ A short introduction (150 words max) summarizing the paper addressing Background/ **Question**/ Hypothesis/ Method/ Results/ **Conclusion**/ Future direction.
2-3) Summarize the two most critical findings of the paper (each, 150 words max). In each paragraph, summarize the important finding by addressing for each the: Background/ **Question**/ Hypothesis/ Method/ Results/ **Conclusion**/ Future direction.
4) A discussion (150 words max) addressing the step of the future research that derived directly from this paper.

Writing assignments must be submitted on BOTH Blackboard as a word document **and** handed in as typed hard copies on or before the due date, **no exceptions**. Papers handed in late will receive a penalty of 10% per day late. Papers longer then 600 words will receive an additional penalty of at least 10%.

The term paper and midterm exam requires individual research and writing. Therefore, students handing in assignments that do not represent their own work will receive a failing grade in this course.

Pre-class writing assignments:
Before the first discussion of each paper, you must submit assignments to Blackboard as a word document and as a hard copy. Do not forget to bring an extra hard copy to use in class to present your work. Because these preparations are critical for your participation in class, failing to submit the assignment before each class will result in a **50% grade reduction for the assignment**. Assignments are due at 8 AM on the day the paper will be first discussed in order for me to evaluate your level of understanding and adjust the class accordingly.

The pre-class assignment for the first time a paper is discussed is:

- Read the new paper (Make sure you find out the meaning of key words that you are not familiar with) and upload a file with these 4 questions and your answer to them into Blackboard:
    1. How was the reading experience? Provide examples from the reading experience.
    2. Write at least 3 terms used in the paper that you needed to research, then write their precise meaning as you understand it from your internet search, and finally, explain how this meaning applies to the text you read and if it makes sense.
    3. Write clearly 3 points of interest and explain why they interest you (be prepared to share them in class).
    4. Write in 150 words of a clear, concise, and cohesive paragraph about the paper including: Background, **Question**, Hypothesis, Method, Results, **Conclusion**, Future direction.

The assignment for the 2nd and other times a paper is discussed that are not the last times a paper is discussed:

- Reread the paper and find out the meaning of key words that you are not familiar with, then upload a file with your answers to the following 4 questions into Blackboard:
    1. Did you read the paper again? How was the reading experience now compared to your previous reading?
    2. Write at least 3 terms used in the paper that you needed to research, than write their precise meaning (as you understand it from your Internet search), and finally, explain how this meaning applies to the text you read and if it makes sense.
    3. Redo the 150 word Writing Assignments described in the syllabus. You must accept all old changes and track your new changes for me to see.
        a. To track changes or accept changes go to "Tools," "Track changes" or find the shortcuts in the "Review" tab.
    4. Please describe most significant figure of the paper using 150 words and Background, **Question**, Hypothesis, Method, Results, **Conclusion**, Future direction. Highlight each of the sections with the distinct formats specified previously.

The assignment for the last times a paper is discussed:

Write a short 150 words research proposal to extend the paper's finding to the next level. Make sure to use all general text formatting instructions found in the syllabus including: Background**,** **Question,** Hypothesis, Method, Results**,** **Conclusion,** Future direction.

Extra credit assignments

Extra credit assignment 1 (each time you will do it properly, you will get 2% increase of your total grade up to 5% if you do it to 3 presentations)**:**

1. Watch the video of Susan McConnell (Stanford) titled: *Designing effective scientific presentations*, which is found at: http://www.youtube.com/watch?v=Hp7Id3Yb9XQ.
2. Make a checklist of all the points made in the video to use as a guide when preparing your presentation.
3. Near each point in the checklist give an example from your presentation.
4. Upload the checklist with your examples to Blackboard.

Extra credit assignment 2 (each time you will do it properly you will get 2% increase of your total grade up to 5% if you do it to 3 times):

- Attend a departmental guest seminar and write a 150-word summary. Make sure to use all general text formatting instructions found in the syllabus including: Background**,** **Question,** Hypothesis, Method, Results**,** **Conclusion,** Future direction.

Rubric for all writing assignments:

100%	75%	50%	25%
Satisfactory: Clear, supported by evidence, concise, includes an evaluation, and follow all formatting and writing guidelines.	Can be improved: i.e. Slight improvement in a few of the grade points.	Requires substantial improvement: i.e. Substantial improvement in a few of the grade points.	Deficient: Missing many of the grade points.

Team Work and Peer reviews:

At the end of the first class, students will be grouped into teams of 4 to 6 students that will review papers together, divide the paper presentation, and peer review each other's work in a 1 hour weekly meeting, outside of class. Each team has a team leader that will coordinate the team activities. Students interested in being a team leader should contact the instructor ASAP. Each student will assess themselves separately for participation in the one-hour weekly team and peer review.

Rubric for Participation in the one-hour weekly team meeting: at the end of each meeting, each student will assess themselves. Making 5 constructive comments for a full grade (100), 4 constructive comments for a grade of 90, 3 constructive comments or less for a grade of 80, 70, and 60 respectively. If you were not present, give yourself a grade of 0. Team leaders will update a participation table and give it to the instructor in the class immediately after the team meeting:

Team # Week #, date	Student name	Student name	Student name	Student name	Student name	Student name
Week 1,						
Week 2,						
Week 3,						
Week 4,						
Week 5,						
Week 6,						
Week 7,						
Week 8,						
Week 9,						
Week 10,						
Week 11,						
Week 12,						
Week 13,						
Week 14,						
Week 15,						
Week 16,						

Peer reviewers are the other students in the team, who observe the students' practice presentations before the in-class presentation, and advise them on how to improve it.

Rubric for Peer reviewers: at the end of peer review, the peer reviewers will assess themselves making 5 constructive comments for a full grade (100), 4 constructive comments for a grade of 90, 3 constructive comments or less for a grade of 80, 70, and 60 correspondingly. If you were not present give yourself a grade of 0. Team leaders will update a participation table and give it to the instructor in the class immediately after the peer review:

Presentation	Date of class presentation	Presenter name	Peer reviewer name	Peer review date	Peer review grad
Paper 1					
1st presentation					
2nd presentation					
3rd presentation					
4th presentation					
5th presentation					
6th presentation					
Paper 2					
1st presentation					
2nd presentation					
3rd presentation					
4th presentation					
5th presentation					
6th presentation					
Paper 3					
1st presentation					
2nd presentation					
3rd presentation					
4th presentation					
5th presentation					
6th presentation					

Oral presentation of the paper figures:
Each class meeting, students from one team will make an oral presentation to the class; students should expect to present multiple times during the course. A student will present one of the paper's figures as if he or she was one of the paper's authors. The goal of the presentation is to explain the figure. Presentations will consist of a multi-slide PowerPoint presentation that includes: Titles, Figure panels, and the notes (in the notes section, not on the slide itself) with what the presenter is planning to say. At the end of each student's presentation, there will be a discussion, as is usually the case when scientists present their work in a meeting. The student presenting the figure will answer questions and defend the work as if he or she was the author.

Each student's presentation should take 10 minutes or less. An excellent presentation is one that spends about one minute on each conceptual point presented in 1 slide (usually each panel in a figure is one slide). Presentations should be short, concise, and to the point.

Following up the presentation of each student, the instructors and students will provide feedback on the presentation with constructive suggestions for improvement in class.

Rubric:

Weight/ Grade	100%	75%	50%	25% or 0%
	Clear, concise, supported, and explained significance	Can be improved	Requires substantial improvement	Deficient or Missing
5%	**Introductory statement**: Short 1-3 sentence statement that describes the figure's subject, its conclusion and significance, and the role of the figure that is about to be presented in the paper			
5%	**Fig/Presentation** background**:** A slide that provides of the background leading to the experiments describe in the figure.			
5%	**Fig/Presentation question:** A slide that shows what is known before this figure – and shows the gap in knowledge that this figure will complement. Why is this question important?			
5%	**Presentation hypothesis:** A slide that describes the hypothesis addressed in the figure			
40%	**Then for each panel in the presentation describe** **a) Question** - What is not known that led to this experiment? **b)** Hypothesis - What is the author's hypothesis? **c)** Method – What was the experimental method? What are the advantages and limitations of the method? **d) Results** - What did the authors find? **e) Conclusion** - What is the author's interpretation? Do you agree with it?			
5%	**Overall summary and conclusion of the figure:** Explaining figure conclusion			
5%	Future direction **- What is next?**			
General				
10%	Slide Titles	Described concisely the take home message	Vague, too long, or not to the point	Does not include the slide premise	Missing
10%	Cohesiveness of presentation	There is clear connection in the transition between slides	The transition between slides can be improved	The transition between slides needs major improvements	Missing
5%	Presentation mechanics	Students faced the audience and pointed to all slide elements at the appropriate time.	Students inconsistently faced the audience or failed to point to the slide elements.	Students rarely faced the audience or failed to point to the slide elements.	Students did not face the audience or failed to point to the slide elements.
5%	Questions and answer section	Question content is repeated and the answer is to the point	Inconsistent question repeating or answer is unfocused	Failing to repeat the question and providing an answer that needs major improvements	Failing to repeat question and providing an irrelevant or wrong answer

Clicker questions:

DEADLINE TO BE REGISTERED on Blackboard is one week from the first class. If you change clickers, immediately inform the instructor by email, providing him the old clicker number and the new clicker number. Then register your new clicker. We will use Turning Technologies (Clickers) in class every class.

Each class starts with several questions intended to verify that the student read, remembered, and understood the paper. This can be: explaining a critical word in the paper, explaining a key concept in the paper, explaining a method used, explaining a paper's figure, or explaining how the paper reached its conclusion. For papers discussed over several meetings, the questions require a higher level of understanding in the later meetings.

Attendance

Since this course is based on demonstrating comprehension of the materials presented, students are required to attend every class. Unexcused absences will not be tolerated, and excused absences should be rare and supported by a physician's note or other piece of documentation. **Students that miss 6 or more classes will automatically fail the class.**

Student must attend or perform the activities in all the first 6 classes, as they are critical to attaining the course goals. Students that are missing any of these classes will need to submit to the instructor all class activities within 1 week of their enrolling in the course or returning to class after being absent. Students failing to follow these instructions precisely will lose at least a full letter grade from their final semester grade in the course.

Class participation

Students must actively participate in class discussions and demonstrate that they have read the assigned paper, analyzed the paper critically, and have done the extra background analysis needed to comprehend the material. Prior to coming to class, students are required to research all aspects of the paper until they understand it completely and are ready to discuss it with their classmates.

Rubric:

Full grade (100) - student made 2 or more meaningful contributions to the discussion.
80 - student made 1 contribution to the discussion.
50 - student that listened attentively to the discussion.
0 - Absence from class or not listening to the discussion.

At the end of each class, each student will submit a paper describing the contributions he or she made to the class discussion that contains the following information:

Name: Date: Grade:
One sentence description of the most meaningful contribution you made:
One sentence description of the second most meaningful contribution you made:
One sentence description of evidence that you have listened attentively to the discussion:

COMMUNICATION GUIDELINES

As your instructor, I am here to help, and will do my best to respond to mail within 24 to 48 hours. Students are expected to check the course's blackboard site frequently for important course information. In addition, if you are having difficulty in the course or trouble understanding any aspect of it, please let me know.

STUDENT SUPPORT SERVICES

The University of Toledo offers a wide range of academic and student support services that can help you succeed:

Tutoring Services Tutoring - Available through the Learning Enhancement Center located in the Carlson Library. Tutoring Services are offered in an array of subjects, including Writing and Biology.

The Writing Center - Provides free, face-to-face and online tutoring for writers. The staff there can assist you with your weekly writing assignments (but not in your mid or final term assignments which are an exam).

The Counseling Center - In need of crisis intervention or mental health services please contact the Center.

Success Coach – help students navigate their college experience by serving as a single point of contact.

REQUIRED TEXTS AND ANCILLARY MATERIALS

The Science of Scientific Writing. This article can be downloaded from http://engineering.missouri.edu/civil/files/science-of-writing.pdf. Originally it appeared in American Scientist, journal of Sigma Xi.

ISBN-13: 978-0205747467 *Style: Lessons in Clarity and Grace (10th Edition) by Gregory G. Colomb and Gregory G. Colomb*. This book explains how to write clearly, simply and concisely.

doi:10.1016/j.molcel.2009.10.007 How to give a good talk. Uri Alon *2009 Oct 23;36(2):165-7.* This article can be downloaded from http://www.sciencedirect.com/science/article/pii/S1097276509007424

ISBN 13: 9780879697358 *Experimental Design for Biologists by David J. Glass*
publication date: Nov 28, 2006 | ISBN-10: 0879697350 | ISBN-13: 978-0879697358 | Edition: 1.

Papers that will be used in the course

In the beginning of the course, the Instructor will present:

1. Centrioles, Centrosomes, and Cilia in Health and Disease *doi:10.1016/j.cell.2009.10.036*
2. Functional genomic analysis of cell division in *C. elegans* using RNAi of genes on chromosome III By Gönczy P et. al Nature. 2000 Nov 16;408(6810):331-6.

Next, the student groups will present these papers (in this order):

1st round of presentations:

3. SAS-4 is a C. elegans centriolar protein that controls centrosome size By Kirkham M et al. Cell. 2003 Feb 21;112(4):575-87 (Group 1; 7 figures)
4. Flies without centrioles By Basto R et al Cell. 2006 Jun 30;125(7):1375-86 (Group 2; 7 figures)
5. A centrosomal mechanism involving CDK5RAP2 and CENPJ controls brain size By Bond J, Nat Genet. 2005 Apr;37(4):353-5. (Group 3; 2 figures)
6. Novel CENPJ mutation causes Seckel syndrome (Group 3; 3 figures)

2nd round of presentations

7. Asymmetric centrosome inheritance maintains neural progenitors in the neocortex (Group 1; 5 figures)
8. PLK2 phosphorylation is critical for CPAP function in procentriole formation during the centrosome cycle. (Group 2; 8 figures)
9. Subdiffraction-resolution fluorescence microscopy reveals a domain of the centrosome critical for pericentriolar material organization By Mennella V et al. Nat Cell Biol. 2012 Nov;14(11):1159-68. (Group 3; 7 figures)

3rd round of presentations

10. Human microcephaly protein CEP135 binds to hSAS-6 and CPAP, and is required for centriole assembly (Group 1; 9 figures)
11. CEP120 interacts with CPAP and positively regulates centriole (Group 2; 5 figures)
12. Crystal structures of the CPAP/STIL complex reveal its role in centriole assembly and human microcephaly (Group 3; 5 figures).

TECHNOLOGY REQUIREMENTS

Clickers are required and need to be registered with blackboard.

Homework and instruction require Microsoft word and power point.

All assignment and course material are provided via Blackboard. It is your responsibility to routinely read the Blackboard postings (e.g. announcements and assignments).

UNIVERSITY POLICIES

The University is an equal opportunity educational institution.

The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office.

ACADEMIC POLICIES

As a student in my course and enrolled at The University of Toledo you should be familiar with the policies that govern the institution's academic processes including: Academic Dishonesty, Enrollment, Status, and Grades. Please read Undergraduate Academic Policies.

COURSE SCHEDULE

This is an approximated course schedule and it is subject to change depending on progress in class.

Part 1 – introduction BO 1099

Class 1: Introduction, team assignment, Syllabus - BO 1099
Class 2: Scientific Writing - BO 1099.
Class 3: How scientists communicate – Searching for papers and how to use EndNote (computer lab) - BO 1099

Part 2 – Instractor presentations - Wolfe Hall 1240

Class 4: Centriole centrosome and cilium review (**1**) – what are review papers?

RNAi Screen paper: (**2)** Functional genomic analysis of cell division in C. elegans using RNAi of genes on chromosome …
Class 5: RNAi Screen paper part 1 – student present and rework the 150 word summery.
Class 6: RNAi Screen paper part 2 - how to present – faculty presentation of table 1 and fig xxx
Class 7: Discussing next research step assignment

Part 3 – student 1st presentations - Wolfe Hall 1240

Student 1st paper: (**3)** SAS-4 is a C. elegans centriolar protein that controls centrosome size (**Group 1; 7 figures**)
Class 8: Student 1st paper part 1 – student present and rework the 150 word summery
Class 9: Student 1st paper part 2- Student present fig 1, 2, 3
Class 10: Student 1st paper part 3- Student present fig 4, 5, 6
Class 11: Student 1st paper part 4- Student present fig 7 and Discussing proposal for future research

Student 2nd paper: (**4)** Flies without centrioles By Basto R et al Cell. 2006 Jun 30;125(7):1375-86 (**Group 2; 7 figures**)
Class 12: Student 3rd paper: part 1- Student present fig 1, 2, 3
Class 13: Student 3rd paper: part 2- Student present fig 4, 5, 6
Class 14: Student 3rd paper: part 3- Student present fig 7 and Discuses proposal for future research

Student 3rd paper: (**5)** A centrosomal mechanism involving CDK5RAP2 and CENPJ controls brain (**Group 3; 2 figures**)
Class 15: Student 4th paper: part 1 – Student presents fig 1 and 2
Class 16: Mid term exam

Student 4th paper: (**6)** Novel CENPJ mutation causes Seckel syndrome (**Group 3; 3 figures**)
Class 17: Student 5th paper: part 1- Student presents fig 1, 2, and 3
Class 18: Student 5th paper: part 2- Student discuses proposal for future research

Part 4 – student 2nd presentations - Wolfe Hall 1240

Student 5th paper: (**7)** Asymmetric centrosome inheritance maintains neural progenitors … (**Group 1; 5 figures**)
Class 19: Student 6th paper: part 1- Student presents fig 1, 2, 3
Class 20: Student 6th paper: part 2- Student presents fig 4 and 5 and Discuses proposal for future research

Student 6th paper: (**8)** Subdiffraction-resolution fluorescence microscopy reveals a domain …. (**Group 2; 7 figures**)
Class 21: Student 7th paper: part 1- Student presents fig 1, 2, 3
Class 22: Student 7th paper: part 2- Student presents fig 4, 5, 6
Class 23: Student 7th paper: part 3- Student presents fig 7 and Discuses proposal for future research

Student 7th paper: (**9)** Human microcephaly protein CEP135 binds to hSAS-6 and CPAP, and is … (**Group 3; 9 figures**)
Class 24: Student 8th paper: part 1- Student presents fig 1, 2, 3
Class 25: Student 8th paper: part 2- Student presents fig 4, 5, 6
Class 26: Student 8th paper: part 3- Student presents fig 7, 8, 9
Class 27: Student 8th paper: part 4- Discuses proposal for future research.

Part 5 –presentations of student-selected papers– for students interested to improve grade- Wolfe Hall 1240
Class 28: xxx
Class 29: xxx
Class 30: xxx