STATE UNIVERSITY of NEW YORK at BUFFALO
Department of Biological Sciences

BIO 420 Cytogenetics **Syllabus** **Spring Semester 2018**

Laboratories: M,W,F: 13:00 – 15:00; Rm 310 Hochstetter Hall
Academic Credit: 3 Credits
Instructor: James R LaFountain 657 Cooke Hall
Office Hours: W: 08:00 – 09:00
Teaching Assistants: Brandon Battaglia, Diamile Tavarez

Course Description from Undergraduate Catalog: Cytogenetics is the study of the chromosomal basis of heredity. This course puts emphasis on chromosome organization and the behavior of chromosomes during mitosis and meiosis. Hands-on experience is gained in the laboratory through the study of a variety of model systems.
Additional: The course is divided into four blocks, each containing a different project to be completed by the end of the block. Each block culminates with the presentation of a PowerPoint poster that presents the results obtained during that block. The outline below summarizes the content of each block, giving the specific student activities and outcomes expected from each.

Relationship of course to BIO undergraduate programs:
Students enrolled in undergraduate programs offered by the Department of Biological Sciences are required to complete at least six credit hours of laboratory experience so that they have a foundation for engaging in laboratory practice on the outside upon completion of a UB program. This course offers specialized training in light microscope imaging and image analysis, specimen preparation for light microscopy, and experience in interpretation of chromosome preparations from several model organisms. The underlying theme of all of these experiences is cytogenetics, the field that concentrates on the chromosomal basis of heredity. Students have the opportunity to master several technical skills that are used in cytogenetics, as well as to gain knowledge about karyotype analysis and the mechanism(s) underlying normal and anomalous chromosome segregation.

Student learning outcomes:
Practical outcomes:
1. to develop expertise in using compound light microscopes to study and to generate digital images of microscope slides containing course-relevant material
2. to become proficient in image analysis in order to convert image detail into quantitative data
3. to be capable of performing micro-scale dissections in order to extract the biological material used in slide preparation
4. to learn basic techniques of slide preparations of microstructures that may subsequently be studied with a compound microscope.
5. to become proficient in assembling a PowerPoint poster of data obtained using above outcomes.
Conceptual:
6. to search for answers to questions related to concepts that are being emphasized during each project
7. to demonstrate understanding of course material in writing (written assignments and PowerPoint posters) and in oral communication (poster presentation)
8. to express clearly in conversations that are ongoing during lab sessions what the objectives and background of each project are

9. to achieve a professional understanding of the main topics under consideration, e.g. karyotype analysis, mitosis, meiosis, chromosome organization, etc.

Student activities

1. Attend lab sessions and complete all four projects by the project's due date (poster presentation day). Overtime is available in cases where more time outside of regularly scheduled class time is needed.
2. Assemble four PowerPoint posters, each of which summarizes the outcome of each project. Poster specifications stating the necessary details to be included on the poster are distributed prior to poster presentation deadlines. Posters will be graded according to the way specifications are met and according to how the student is able to present/discuss the contents of the poster.

N.B. The content of a poster is to be the student's own work; sharing of images, etc. is not permitted.

3. Give an oral presentation of one of the four posters to the instructor and the other three members of the student's group. The class is divided into four groups of four students in each group. Each of the four students presents his/her poster to the group, so that by the end of the semester all four students in the group present one of their four posters.
Attendance at poster presentations is mandatory at the scheduled time of the presentation. There are penalties for tardiness.
4. Achieve understanding of theoretical background underlying each project through outside study and completion of written assignments that are linked to each project. Each written assignment is to be handed in as a typed, printed hard copy by the end of lab on the specified due date.

N.B. Students may research a topic with others, but papers are to be each student's work, not a collaborative piece.

Lab notebook: each student is expected to use a lab notebook, i.e. a three-ring binder including ruled paper. This serves two purposes: (1) entries made on a daily basis keep a record of what was done in the lab, (2) it helps in the storage of notes taken during lab lectures, and (3) it helps consolidate photocopies of lab protocols and other hand-outs that will be provided.

Microscope slides: enrollees are expected to make as many slides as is necessary to fully complete each assignment. At the end of each assignment, the student's best slide will be collected for evaluation be the instructor.

Lab tools: Some of the tools will be provided by the course, but others will need to be purchased, all of which are expected to be kept in a tool kit kept at each student's bench drawer. Purchase: fine-tipped DuMont #5 forceps (Fine Science Tools, catalog number 11251-20 Inox DuMont #5): need two of these, one for each hand.

Grading:

1. All grading is based on the instructor's evaluation of completed assignments. Each poster is weighted as 20% of the final grade; altogether, graded written assignments are weighted as 20% of the final grade (each of the eight graded assignments is 2.5% of the final grade)

2. Assignments are given a letter grade. Letter grades convert to quality points by way of the standard quality point scale in the table below.

Letter grade	Quality point scale
A	4.0
A-	3.67
B+	3.33
B	3.0
B-	2.67
C+	2.33
C	2
C-	1.67
D+	1.33
D	1.0
F	0

3. Mid-term grades are provided at about the 7th week of the course (about the middle of October).

4. Final grades are awarded based on the cumulative average of the individual letter grades from on each assignment. The weight of each graded written assignment is 2.5% of the total, and the grade on each poster is weighted 20% of the total. The quality point range for each final letter grade is:

Final letter grade	Quality point range
A	3.68 – 4.0
A-	3.34 – 3.67
B+	3.01 – 3.33
B	2.68 – 3.0
B-	2.34 – 2.67
C+	2.01 – 2.33
C	1.68 – 2.0
C-	1.34 – 1.67
D+	1.01 – 1.33
D	0.68 – 1.0
F	0 – 0.67

Course schedule with due dates

Block 1: human karyotype analysis **January 28-February 21**	
February 2	Written assignment 1
February 9	Written assignment 2
February 16	Written assignment 3
February 21	**Poster 1**

Block 2: *Vicia faba* mitosis **February 23-March 14**	
February 23	Written assignment 4
March 2	Written assignment 5
March 9	Written assignment 6
March 14	**Poster 2**
March	
March 14	*Vicia faba* mitosis slides

Block 3: crane-fly meiosis **March 26-April 18**	
March 30	Written assignment 7
April 6	Written assignment 8
April 13	Written assignment 9
April 18	**Poster 3**
April 18	Crane-fly meiosis slides

Block 4: *Drosophila* polytene chromosomes **April 20-May 9**	
April 20	Written assignment 10
April 27	Written assignment 11
May 4	Written assignment 12
May 9	**Poster 4**

May 11 **Last Day of Lab**

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