



## Oficial Syllabus

### Cytogenetics BIOL 6356

<b>Credit hours:</b> 3	<b>Contact hours:</b> 5
<b>Prerequisites:</b> Biol 3300	<b>Corequisites:</b> none
<b>Course description in Spanish:</b>	
<b>Course description in English:</b> “A study of different aspects of the cell which affect inheritance.” The purpose of the course is to provide a working knowledge of cytogenetics, the preparation of materials for study, and the importance of chromosomal variations in structure and number in such fields as plant and animal breeding, population genetics, evolutionary genetics, taxonomy, and the medical sciences.  The student will be able to recognize, describe and discuss in detail the different aspects of chromosomal structure, number, and behavior, and their effects at the organismal, population and species levels. They will describe and discuss this material in detail on two essay lecture exams, demonstrating their mastery of the material. The student may write in English, Spanish or French.	
<b>Objectives:</b>  The purpose of the course is to provide a working knowledge of cytogenetics, the preparation of materials for study, and the importance of chromosomal variations in structure and number in such fields as plant and animal breeding, population genetics, evolutionary genetics, taxonomy, and the medical sciences.  The student will be able to recognize, describe and discuss in detail the different aspects of chromosomal structure, number, and behavior, and their effects at the organismal, population and species levels. They will describe and discuss this material in detail on two essay lecture exams, demonstrating their mastery of the material. The student may write in English, Spanish or French.	

#### Outline of content:

<b>Topics to be covered</b>	<b>Contact hours</b>
1. Structure and function of chromosomes. - chemical composition, telomeres, centromeres and kinetochores, nucleolar organizers, chromomeres, euchromatin and heterochromatin, unique and repetitive DNA, chromosome	13

structure throughout the cell cycle, banded chromosomes, lampbrush chromosomes, polytene chromosomes, B chromosomes.	
2. [Mitosis and meiosis will be covered in laboratory.] Endomitosis and polyteny, molecular mechanism of crossing over, chromosomal evidence of crossing over, environmental and genetic factors which affect the frequency of crossing over, genetic control of meiosis.	3
3. Variations in chromosome structure: The origin and adaptive significance (and use in plant breeding where appropriate) of duplications, deletions, inversions, and translocations, isochromosomes, ring chromosomes, centric fusions and fissions.	8
4. Changes in chromosome number - aneuploidy and euploidy in both plants and animals, their origins, cytogenetic effects, use in crop breeding, and adaptive significance.	5
5. Variant chromosomal systems. - asexual reproduction, modified sexual reproduction (various forms of parthenogenesis), chromosome diminution and elimination.	3
6. Evolution of the karyotype. - evolution of sex chromosomes, (most aspects are covered with their individual topics, such as translocations).	1
<b>LABORATORY TOPICS</b>	
1. Elements of microscopic technique.	3
2. Mitosis - the process of mitosis. Lecture and examination of prepared slides. Preparation of materials for the following laboratory.	3
3. Mitosis - the preparation and analysis of microscope slides of mitosis. Preparation of materials for the following laboratory.	3
4. Mitosis - the preparation and analysis of colchicine-arrested mitoses. The preparation of karyotypes.	6
5. Meiosis - the process of meiosis. Lecture and examination of prepared slides. Collection and preparation of materials for the following laboratory.	6
6. Meiosis - the demonstration and analysis of meiosis in various species (the student makes their own slides). Preparation of materials for the following laboratory.	6
7. Polytene chromosomes, their preparation and analysis. Preparation of materials for the following laboratory.	3
8. Chromosomal aberrations. Their identification in experimental materials. Preparation of materials for the following laboratory.	3
9. Effects of mutagens on chromosomes. Para-diclorobenzene is often used to break chromosomes.	3
The two lecture exams are given during the laboratory periods.	6
<b>Total hours: (should be equivalent to the contact hours of the course)</b>	<b>74</b>

<b>Instructional strategies:</b> <input checked="" type="checkbox"/> lecture <input type="checkbox"/> discussion <input type="checkbox"/> computation <input checked="" type="checkbox"/> laboratory <input type="checkbox"/> seminar with formal presentation <input type="checkbox"/> seminar without formal presentation <input type="checkbox"/> workshop <input type="checkbox"/> art workshop <input type="checkbox"/> practicum <input type="checkbox"/> trip <input type="checkbox"/> thesis <input type="checkbox"/> special problems <input type="checkbox"/> tutorial
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<input type="checkbox"/> research <input type="checkbox"/> other (specify):																		
<b>Minimal resources available:</b>  Microscopes, transparency projector, over-head projector, refrigerator, freezer, balance, microscope slides and cover slips, prepared slides, <u>Drosophila</u> culture media, vials, and plugs, onion or garlic bulbs, flower buds of various plants, constant temperature chamber, chemical reagents and stains.																		
<b>Evaluation strategies and their relative weight:</b>  <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 80%;"></th> <th style="width: 20%;">Percentage</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;"><input checked="" type="checkbox"/> written exams</td> <td><b>67</b></td> </tr> <tr> <td style="text-align: left;"><input type="checkbox"/> oral reports</td> <td></td> </tr> <tr> <td style="text-align: left;"><input type="checkbox"/> monographs</td> <td></td> </tr> <tr> <td style="text-align: left;"><input type="checkbox"/> portfolio</td> <td></td> </tr> <tr> <td style="text-align: left;"><input type="checkbox"/> reflexive diary</td> <td></td> </tr> <tr> <td style="text-align: left;"><input checked="" type="checkbox"/> other (specify): laboratory work</td> <td><b>33</b></td> </tr> <tr> <td style="text-align: left;"> </td> <td></td> </tr> <tr> <td style="text-align: right;"><b>TOTAL: 100%</b></td> <td><b>100</b></td> </tr> </tbody> </table>		Percentage	<input checked="" type="checkbox"/> written exams	<b>67</b>	<input type="checkbox"/> oral reports		<input type="checkbox"/> monographs		<input type="checkbox"/> portfolio		<input type="checkbox"/> reflexive diary		<input checked="" type="checkbox"/> other (specify): laboratory work	<b>33</b>			<b>TOTAL: 100%</b>	<b>100</b>
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<b>Grading system:</b> <input checked="" type="checkbox"/> quantifiable (letter grade) <input type="checkbox"/> not quantifiable																		
<b>References:</b>  The professor has prepared an extensive set of lecture notes on the topics. He gives a master set to the students, which they have photocopied for their own use. These notes are drawn from textbooks (especially the out-of-print text: Swanson, Carl P., Timothy Merz, and William J. Young, 1981. <u>Cytogenetics: The chromosome in division, inheritance and evolution</u> . Second edition. Prentice-Hall, Inc., Englewood Cliffs, NJ 07632.) Journal articles and sections from other books are also used. Some of it is necessarily old, and some of it is very recent. New material is added each time the course is given. Representative journals include: <u>Chromosoma</u> , <u>Genetics</u> , <u>Trends in Genetics</u> , and <u>Genetica</u> , all of which the professor has as hard copies and internet access. The symposium series "Chromosomes Today" is also used, as are <u>Annual Review of Genetics</u> and several out-of-date but irreplaceable reference books.																		

Después de identificarse con el profesor y la institución, los estudiantes con impedimento recibirán acomodo razonable en sus cursos y evaluaciones. Para más información comuníquese con Servicios a Estudiantes con Impedimentos en la Oficina del Decano de Estudiantes (Q-019), 787-265-3862 ó 787-832-4040 x 3250 ó 3258.

Attachments included:

Yes      
 No