**Syllabus**

**Principles of Genetics/BSC324-101/BSC324-102/BSC-103**

4 credit hours

Fall 2014

Times/Location

**Lecture** BSC324-101/102/103 TR12:30 pm-1:45 pm S376

**Lab** BSC324-101 M 1:00 pm-3:50 pm S381

 BSC324-102 T 9:00 am-11:50 am S381

 BSC324-103 W 9:00 am-11:50 am S381

**Instructor**

Herman L. Mays Jr., PhD., Assistant Professor

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**GA**

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Office hours: W 3:00 pm – 4:00 pm TH 3:00 pm – 4:00 pm

**University policies**

By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy be going to [www.marshall.edu/academic-affairs](http://www.marshall.edu/academic-affairs) and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to <http://www.marshall.edu/academic-affairs/?page_id=802>

This link contains university policies for Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

**Course Description**

This course will provide students with a general introduction to the science of biological inheritance. We will cover the broad areas of transmission or classical genetics, molecular genetics and population genetics in a coordinated lecture and laboratory format. The laboratory will be a venue for hands-on laboratory experiments and other exercises designed to illustrate key principles in genetics. Additionally the laboratory will be a forum for reviewing material covered in lecture and participating in discussions and practice problem sessions.

**Student Learning Outcomes**

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| **Learning outcome** | **Activities (lecture and lab)** | **Assessment** |
| Basic principles of transmission genetics | -Lecture, assigned readings and additional media (lecture)-Group problem solving sessions (lecture, lab)-Group activities on Mendelian inheritance and Drosophila genetics (laboratory) | Exams (Lecture)Quizzes (Lecture and laboratory)Lab reports (Laboratory) |
| Basic principles of molecular genetics | -Lecture, assigned readings and additional media (lecture)-Group problem solving sessions (lecture, lab)-Group activities on DNA barcoding (laboratory) | Exams (Lecture)Quizzes (Lecture and laboratory)Lab reports (Laboratory) |
| Basic principles of population genetics and phylogenetic analysis | -Lecture, assigned readings and additional media (lecture)-Group problem solving sessions (lecture, lab)-Group activities genetic drift in Drosophila and phylogenetic analysis (laboratory) | Exams (Lecture)Quizzes (Lecture and laboratory)Lab reports (Laboratory) |
| Basic understanding of the history of genetic science and the major contributors to our understanding of inheritance. | -Lecture, assigned readings and additional media (lecture) | Exams (Lecture)Quizzes (Lecture and laboratory)Lab reports (Laboratory) |
| Broader societal impacts of genetics | -Lecture, assigned readings and additional media (lecture)-Assignment of the film GATTACA to be accompanied by an in class discussion of the broader societal impacts of genetics (lecture) | In class discussion (Lecture and laboratory)Exams (Lecture) |
| Ability to access, analyze and assimilate the scientific literature | In class tutorials on bioinformatics and the scientific literature in general with instructions as to what constitutes valid peer-reviewed source material (Lecture and laboratory)Laboratory reports (Laboratory)  | Exams (Lecture)Quizzes (Lecture and laboratory)Lab reports (Laboratory) |

**Required Text**

Hartl, Daniel L. and Ruvolo, Maryellen. 2012. *Genetics: Analysis of Genes and Genomes, 8th edition*. Jones and Bartlett Learning.

Additional supplemental reading of the primary literature will occur in addition to the textbook readings.

No laboratory manual is required. Laboratory activities will be described on handouts to be distributed in class or over Blackboard.

*Additional material*: GATTACA (1997). You will be assigned this film to watch outside of class for a discussion at the end of the semester on ethics and genetics and society. The film is available from a myriad of sources (iTunes, Netflix, library, etc.) and I encourage you to arrange a time to watch it with your classmates in small groups.

**Student Assessment**

Your grade for the entire course will be a combination of your lecture and laboratory grades.

**Grading Policy – Lecture**

Quizzes (20 points x 3 = 60 points)

Problem-solving sessions (50 points x 3 = 150 points)

Exams (100 points x 3 = 300 points)

Final Exam (100 points)

Total 610 points

A >549

B 488-548

C 427-487

D 366-426

F <366

**Grading – Laboratory**

Quizzes (20 points x 3 = 60 points)

Laboratory reports (100 points x 4 = 400 points)

Final Presentation (100 points)

Total 560 points

A >503

B 448-503

C 392-447

D 336-391

F <336

**Course Schedule – Lecture** **(schedule subject to change as needed)**

August 26 NO CLASS

August 28 First day of lecture

September 1 labor day

September 8 Labs start

*Transmission Genetics and DNA*

August 28 – September 18 Hartl and Ruvolo Chapters 1-5 (we will cover these chapters a little out of order starting with chapters 3-5 followed by chapters 1-2)

September 16 Quiz I (20 points)

September 18 Group problem-solving session I (50 points)

September 23 Exam I (100 points)

*Chromosomes, replication, gene expression and regulation*

September 25 – October 16 Hartl and Ruvolo Chapters 6-8, 10-11

October 14 Quiz II (20 points)

October 16 Group problem-solving session II (50 points)

October 21 Exam II (100 points)

*Mutation, extranuclear inheritance, quantitative genetics, phylogenetics and population genetics*

October 23 – November 18 Hartl and Ruvolo Chapters 14, 16-18

November 13 Quiz III (20 points)

November 18 Group problem-solving session III (50 points)

November 20 Exam III (100 points)

Week of November 24 Thanksgiving/Fall Break NO LECTURE/NO LABS

Week of December 1 DEAD WEEK Review and discussion

Week of December 8 FINALS WEEK

Final Exam Tuesday December 9 12:45 pm - 2:45 pm (100 points)

**Course Schedule – Laboratory (schedule subject to change as needed)**

Laboratory activities are listed by the week they occur. Section 101 activities will occur on Monday of that week, section 102 will occur on Tuesday and section 103 on Wednesday. Labs will likely in most case not take up the entire class period for the laboratory. Remaining time in lab will be reserved for review questions, sample problems, discussion and questions on the material from lecture.

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| **Topic and lab activity** | **Lab week of …** |
| *Transmission Genetics* |  |
| Mendelian inheritance simulation and statistical analysis | September 8 |
| *Drososphila* genetics (Lab report required) | September 15, 22 and 29 |
| *DNA, Molecular Genetics and Bioinformatics* |  |
| PCR and DNA barcoding (Lab report required) | October 6, 13, 20 |
| *Population Genetics and Genetic Drift* |  |
| Genetic Drift in Drosophila (Lab report required) | October 13, 20, 27 and November 3 |
| *Phylogenetic analyses* |   |
| Primate family tree analysis (Lab report required) | November 10 |
| *Group Presentation (submit topic by week of Oct 6)* | November 17  |

August 26 NO CLASS

August 28 First day of lecture

September 1 labor day

September 8 Labs start

Week of November 24 Thanksgiving/Fall Break NO LECTURE/NO LABS

Week of December 1 DEAD WEEK Review and discussion

Week of December 8 FINALS WEEK (no laboratory final, only a lecture final)

**Due dates for lab reports (subject to change if needed)**

*Drosophila genetics* Week of October 13

*PCR and DNA barcoding* Week of October 27

*Genetic drift in Drosophila* Week of November 17

*Phylogenetics* Week of December 1

**Dates for lab quizzes TBA**