Lab Syllabus: Principles of Physics II Lab - Fall-2016-PHYS-2212L-006; (88595)

Section Information: Martin Okafor Fall 2016 PHYS 2212L-006 (88595)

Course Name  Principles of Physics II Lab

Course Description  An introductory laboratory course to accompany PHYS 2212 Principles of Physics II course. This laboratory course will include experiments in electrostatics, electric current and circuits, and electromagnetism, and may also include optics and modern physics. Elementary calculus will be used.

Assignments are designed to introduce the student to scientific investigative procedures, instruct the student in specific laboratory and research skills, and reinforce concepts covered in the lecture.

The course syllabus provides a general plan for the course; deviations may be necessary.

College and Instructor Information

Institution  Georgia State University | Perimeter College
Department of Physical Sciences, Clarkston Campus

Instructor  NAME: Martin O. Okafor
Associate Professor of Physics
http://sites.pc.gsu.edu/mokafor/
Email Address: mokafor@gsu.edu
OFFICE: CC-2162
OFFICE PHONE: 678-891-3759
678-891-3747 (fax); 678-891-3750 (Department Secretary)

Office/Lab Contact Periods  Monday  10:00 am - 12:30 pm; 04:00 pm - 05:00 pm
Tuesday  10:00 am - 12:30 pm; 04:00 pm - 05:30 pm
Wednesday  04:00 pm - 05:00 pm
Thursday  04:00 pm - 05:30 pm
Friday  By Appointment

* Other Times by Appointment.

General Education Outcomes

General Education Goals  General Education Learning Goals for the Core Curriculum:

Goal I-- Communication:
1. Students communicate effectively using appropriate writing conventions and formats.
2. Students communicate effectively using appropriate oral or signed conventions and formats.

Goal II- Collaboration:
1. Students participate effectively in collaborative activities.

Goal III- Critical Thinking:
1. Students formulate appropriate questions for research.
2. Students effectively collect appropriate evidence.
3. Students appropriately evaluate claims, arguments, evidence and hypotheses.
4. Students use the results of analysis to appropriately construct new arguments and formulate new questions.

**Goal IV - Contemporary Issues:**
1. Students effectively analyze contemporary issues within the context of diverse disciplinary perspectives.
2. Students effectively analyze contemporary multicultural, global, and international questions.

**Goal V - Quantitative Skills:**
1. Students effectively perform arithmetic operations, as well as reason and draw appropriate conclusions from numerical information.
2. Students effectively translate problem situations into symbolic representations and use those representations to solve problems.

**Goal VI - Technology:**
1. Students effectively use computers and other technology appropriate to the discipline.

**Specific Learning Outcomes**

- **Discipline-Specific Learning Outcomes:**
  1. **Goal A1 -- Communication Outcomes:**
     a. Students have the ability to assimilate, analyze, and present in oral and written forms, a body of information;
     b. Students have opportunities to improve their physics reading skills and writing skills through course activities, assignments, and problem solving activities;
     c. Students have the ability to communicate scientific investigations and information clearly by writing clear coherent laboratory reports, using data as evidence to support conclusions.

  2. **Learning Goal A2 -- Quantitative Outcomes:**
     a. Quantitative reasoning and mathematics will be characterized by logic, critical evaluation, analysis, synthesis, generalization, modeling, and verbal, numeric, graphic, and symbolic problem solving;
     b. Students develop individual and group problem-solving skills and critical thinking skills, quantitatively and qualitatively through a variety of course related activities

  3. **Learning Goal D -- Natural Sciences:**
     a. Scientific reasoning will be characterized by understanding and applying scientific method using scientific processing skills, emphasizing laboratory techniques, mathematical principles, and relating experimental design to natural phenomena.
     b. Students have the ability to recognize and apply scientific inquiry using conceptual and physical models of phenomena, emphasizing the methods of data collection, doing experiments and relating the outcomes to the relevant theories and physical laws.

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**Course Information**

**Course Section:**
Course number: **PHYS-2212L-006**  
Course Title: **Principles of Physics II Lab**  
Academic term: **Fall Semester 2016**  
Location: **GPC Clarkston - Meets on Wed. (W): 10:00 a.m. - 12:45 p.m.; Rm CC-1210**

- **Course Prerequisites:** PHYS 2211, PHYS 2211L, & MATH 2431 plus exit or exemption from Developmental Studies reading or ENSL 0093 with a C or better.
- **Course Co-requisite:** PHYS 2212 Lecture Course (3 credits).

**Course Description:**
An introductory laboratory course to accompany PHYS 2212 Principles of Physics II course. This laboratory course will include experiments in electrostatics, electric current and circuits, and electromagnetism, and may also include optics and modern physics. Elementary calculus will be used.

Assignments are designed to introduce the student to scientific investigative procedures, instruct the student in specific laboratory and research skills, and reinforce concepts covered in the lecture.
The course syllabus provides a general plan for the course; deviations may be necessary.

Required texts:  
- **Required Text:** Online GPC Lab Resource Manual - Handouts: http://depts.gpc.edu/~claphast/

General Learning Objectives:  
- **Minimum General Learning Objectives for the Introductory Physics Courses:**  
The objective of this physics course sequence is for the student to learn and be proficient in the application of the basic laws of physics. The sub-headings are specifically for the introductory physics laboratories. After taking one or both of the laboratory courses, the student should be able to:

1. interpret physical situations as stated in a word problem  
2. identify the physical laws appropriate to the physical situation at hand:  
   a. discuss the theoretical basis of the performed experiments in terms described by the complimentary lecture course  
3. use various types of data collection tools safely for the experimental investigation of physical laws;  
   a. properly maintain and use a laboratory notebook to clearly and accurately record and communicate information related to experiments performed  
   b. perform basic measurements and use scientific tools to collect data as deemed appropriate for the experiments performed  
   c. use standard safety practices for all classroom and field investigations  
4. use mathematics/physical law as a tool for prediction of behavior of representative physical systems  
   a. analyze an experiment for sources of error  
   b. suggest possible corrections and improvements  
5. represent physical systems in multiple representations mathematically, pictorially, graphically, and/or in written descriptions, etc.  
   a. use tools of technology to present the behavior of physical systems during experiments  
6. translate multiple representations, i.e. written, pictorial, graphical and/or data descriptions, of a physical system into an appropriate mathematical model  
   a. graphically analyze data acquired from an experiment  
   b. deduce valid conclusions from this analysis  
7. write a formal laboratory report appropriate for the level of the introductory physics laboratories.

Course Assessments:  
Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation.

Course content:  
- **Course Content for the PHYS 2212L (Principles of Physics II Lab) course:**  
The following is a list of potential lab experiments covered in the PHYS 2212L (Principles of Physics II Lab) course. Individual campuses choose experiments based on the available equipment and other factors. A minimum of ten (10) labs, plus an introductory activity on measurement techniques and data analysis, must be performed and reported before any student can qualify to earn a passing grade for this course.

1. Basic Electrical Measurements  
2. Electric Field Mapping.  
3. Coulomb’s Law and Force between Charged plates  
4. Ohm’s Law.  
5. Electrical Power and Joule’s law.  
6. DC Circuits and Kirchhoff’s laws.  
7. RC Circuits.  
9. Geometric Optics and Image Formation.  
13. LRC Circuits.  
15. Radioactivity.

*Eleven or more of these experiments must be performed every semester*
Total scores from Pre-Lab assignments, Lab notebook, formal Lab reports and Lab Final Exam will be used to determine the final course grade for the Semester. **Each Student must perform and report a minimum of TEN labs to earn a pass grade for this course.** These ten labs must include, at least, one individual formal laboratory report.

**GRADING CRITERIA:**

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<tr>
<th>MAXIMUM POINTS that can be earned in this course.</th>
<th>1400 pts</th>
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<tr>
<td>The sum of the (ten) highest scores from <strong>TEN Lab Experiment scores.</strong> The total points for each lab experiment, including the points for the lab report, the Assigned (Pre- or Post-lab) <strong>Quizzes,</strong> must add up to 100 points.</td>
<td>1000 pts (MAX)</td>
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<tr>
<td><strong>Laboratory Notebook</strong></td>
<td>50 pts</td>
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<td>A maximum of 5 (five) points may be earned for the quality of each lab notebook record for an experiment session that is signed by the lab instructor or the lab proctor for that day. This notebook score will be based on a 5-3-1 scale. The maximum score for the lab notebook is 50 points.</td>
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<td><strong>Midterm Examination</strong></td>
<td>100 pts</td>
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<td>This Midterm examination covers all experiments performed before the midpoint of the semester. This midterm exam will be given on the date as scheduled in the syllabus!</td>
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<tr>
<td><strong>Final Examination</strong></td>
<td>250 pts</td>
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<td>This comprehensive final examination covers all experiments performed during the semester. The college-wide course-based assessment may be included as a portion of the final exam. The final exam will be given on the scheduled date.</td>
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**Grades:** Reports of students' course grades will be available online. Grades based on the overall computed score for this course will be assigned using the following College-approved standard:

| 1260 to 1400 points (90%) | A |
| 1120 to 1259 points (80%) | B |
| 980 to 1119 points (70%) | C |
| 840 to 979 points (60%) | D |
| Less than 840 points (<60%) | F |

**Content-based Learning Objectives**

At the completion of this PHYS 2212L laboratory course, the student will experimentally demonstrate the ability to:

1. Manipulate electrical measuring instruments such as (a) the multimeter (for measuring current, voltage, and resistance), (b) oscilloscope;
2. Construct the patterns of the electric field in the plane containing two electrodes by plotting equipotential lines around the electrodes
3. Investigate the electric force between two charged conducting plates and apply Coulomb's law to calculate the electric permittivity of the medium between those plates
4. Build a simple electric circuit and draw electric circuit diagrams; apply Ohm's law to investigate the current-voltage relationship to ohmic and non-ohmic resistors
5. Apply Ohm's law with the voltmeter-ammeter method to verify the mathematical relation for the equivalent resistance of a group of resistors that are connected in a series or parallel configurations
6. Determine the electrical equivalent of heat by comparing the electrical power supplied to a resistor with the heat energy dissipated by the resistor
7. Apply Kirchhoff's rules to analyze a multi-loop circuit with multiple voltage sources to determine the currents and voltages across the circuit resistors
8. Investigate the exponential variation of voltage with time for a series resistor-capacitor circuit; determine the value of an unknown capacitor from the measurements of the RC time-constant of the
9. Investigate the magnetic force between two parallel current-carrying conductors; determine the magnetic permeability constant of the medium between the conductors.

10. Investigate the variation of the magnetic field inside a current-carrying solenoid along the symmetry axis of the solenoid.

11. Locate images formed by mirrors and lenses; measure the focal length of concave and convex mirrors; refractive index of glass by applying Snell’s law; determine the critical angle at which total internal reflection occurs in glass.

12. Determine the wavelength of monochromatic light passing through a pair of parallel slits based on the relative intensity-position graph of the double-slit interference pattern.

13. Determine the wavelength of monochromatic light passing through a single slit based on the minima-maxima of the relative intensity-position graph of the diffraction pattern; compare the interference-diffraction intensity variations of the double-slit and single slit.

Content-based assessments must include material from Electricity, Magnetism, and Optics and Modern Physics.

### Schedule

<table>
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<tr>
<th>Lab Experiment Schedule</th>
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<tr>
<td><strong>Fall 2016</strong></td>
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<td>Wednesday</td>
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<td>24-Aug-2016</td>
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<td>31-Aug-2016</td>
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<td>07-Sep-2016</td>
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<td>09-Nov-2016</td>
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<td>16-Nov-2016</td>
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<td>30-Nov-2016</td>
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Special instructions, substitutions and guidelines for experiments may be given by the laboratory instructors if and when necessary.

**Lab Final Exams:** PHYS 2212L-006

**Wednesday Nov. 30, 2016;**

**Time:** 10:30 a.m. - 12:30 p.m.

*(The Instructor may change Test/Exam dates, if and when necessary). *Å§ Take-home assignments will be required.

### General Semester Calendar

- **DATES TO REMEMBER!**
  - **August 22, 2016**
    - First day of classes
  - **September 5, 2016**
    - Holiday, Labor Day (no classes)
  - **October 11, 2016**
    - Midpoint for the full semester courses.
    - Last day to Withdraw
  - **Nov. 21 - 26, 2016**
    - Thanksgiving Holidays (no classes)
  - **Dec. 5, 2016**
    - Last day of classes for full semester classes
Dec. 6 - 13, 2016  Final Exams for full semester courses

**Attendance and Withdrawal Policy**

You are responsible for all announcements made in the laboratory. Absence from labs does not relieve you of this responsibility. Special instructions related to specific experiments may be given.

### ATTENDANCE and PARTICIPATION:

Class attendance and participation are required for this lab course. Some assignments may be posted online. If you experience any technical difficulties with your access and participation, please contact the instructor immediately. Students must attend all lab sessions and must be punctual to every lab session. Any student who attends a lab session fifteen or more minutes late may not be allowed to perform the experiments and will receive a score of 0% (zero percent) for that week's lab session.

**NO SHOW:** If you do not attend class on campus within the first 1-2 weeks, you will be reported during the "ROLL/ATTENDANCE Verification" period for non-attendance or as a no-show. Once you are reported as "NEVER ATTENDED/PARTICIPATED" or "STOPPED ATTENDING/PARTICIPATING", a course grade of "-W" or "W" may be entered on your record for the course.

No lab make-ups will be allowed. Special considerations will be given to an extenuating circumstance as may be determined by the Lab instructor. Any student who misses more than one lab session will be withdrawn from this lab course with a grade of "W" or "F" depending on whether the second lab is missed before or after the midpoint of the semester.

If a student finds it necessary to stop coming to lab, the student should take time to initiate the withdrawal from class. Due to failure to withdraw officially from class, a grade of "F" will be reported for the student at the end of the semester.

### WITHDRAWAL POLICY

Any student who withdraws or is withdrawn from the lecture must also withdraw or be withdrawn from the co-requisite lab. Likewise, any student who withdraws/is withdrawn from the lab must also withdraw/be withdrawn from the co-requisite lecture. Students who do not meet the prerequisite(s) for this course will be withdrawn. It is recommended that any student who does not meet the prerequisite(s) for this course drop this course during the Add-Drop period in order to receive any refund according to the institutional refund policy.

A student who withdraws or is withdrawn officially from the course by the mid-point of the semester will receive a grade of "-W". A student who withdraws after the mid-point of the total grading period (including final exams) will receive a "W" unless the withdrawal is officially approved by the institution.

**Lab Guidelines:**

- **Lab Notebooks:** The lab notebook is a record-keeping tool that demonstrates the level of involvement of a student/scientist in the laboratory and lectures. The lab notebook can be an effective and useful learning tool. Each student must maintain a lab notebook for the entire lab course. Students will record notes from pre-lab and post-lab discussions, all raw data acquired from an experiment, relevant information obtained from textbooks or online sources, and show all calculations in the lab notebook. The quality of the lab notebook is determined from the format and organization of records, evidence of attention to record their involvement in the experiment.

  Every student must ensure that the lab instructor or designated proctor signs the notebook entry before the student leaves the lab. All acquired data must be recorded in the lab notebook. Any cancelled lab notebook entry must be noted and legible. Failure to follow these guidelines may result in a reduced notebook score for that lab experiment.

- **Lab Prep Notes:** When necessary, modifications to an experiment will be announced and posted on the lab iCollege web page or written on the whiteboard in the lab. It is the responsibility of the student to record these prep notes in the lab notebook.

- **Lab Reports:** Lab reports will be graded following the guidelines for Formal Lab Reports. All reports must be submitted as specified by the instructor. Pre-Lab assignments must be submitted within the first fifteen minutes of a lab session unless specified otherwise. Every student must submit, at least, one individual formal lab report.

  All lab reports must be based on data collectively acquired by all members of that group of experimenters. Prior to the midpoint of the semester, every lab group must submit one formal lab report for each experiment performed.

  After the midpoint of the semester, only one member of a lab group (who signed up for a specific experiment is required to submit an individual formal lab report for that specific experiment, from that group. Other members of that lab group will collectively submit ONE group formal report for that lab experiment.
Individual formal lab reports can only be submitted starting with Lab #6. All lab reports may be kept by the Lab Instructor. Any lab reports submitted two days past the scheduled due date, may not be graded!

Lab Partners: Lab partners may be assigned by the Instructor on a rotational or random basis. Lab participants in a group must take turns in performing roles required in conducting the experimental procedure, which involves data acquisition and data analysis. A group lab report must show only the names of the active participants in each lab group. No excuses! Any student who does not actively participate in the data acquisition or data analysis during the lab session is not permitted to report any group's data for the experiment. No lab group is allowed to share experimental data with another group without prior approval by the instructor. Such action will be considered as cheating and hence punishable.

Within-Group Peer Assessment: The Level of Participation of each group member is assessed weekly by his/her within-group peers for each lab performed. The participation level of each group member is rated by within-group peers on the individual’s performance level in assigned group roles during the conduct of the lab experiments and during the preparation of the lab report. The average of the within-group peer ratings is added to the individual’s earned points for a particular lab report.

Questions: Whenever in doubt concerning any aspect of the lab, please do not hesitate to ask the lab Instructor. The lab process should be a learning exercise!

Lab Equipment: For every experiment, you must exercise reasonable care in handling and operating any equipment. An entire lab group will be held responsible for any lab equipment and other materials assigned to the group.

Special Instructions/Safety: Science Laboratories typically utilize materials which, if handled improperly, may have a hazardous effect on the health of students. This is particularly true for those students who, because of a pre-existing health condition, may be abnormally at risk. Examples of such include (but are not limited to):

- the wearing of contact lenses
- pregnancy
- nursing mothers
- depression of immune system (disease, chemotherapy, transplant patients, etc...)
- allergies

If you are in any of the above conditions, or are aware of any other condition which would make you especially susceptible to infection and/or toxicity from substances used in this laboratory, please advise the Lab Instructor so that your safety can be given proper consideration.

Students must not eat or drink in the laboratory!

All students must strictly observe and adhere to all safety rules and regulations established for the science labs.

GPC Policies

POLICY ON ACADEMIC HONESTY

GSU's Academic Honesty Policy can be found at the following link:

This Policy on Academic Honesty (Policy) provides examples and definitions intended to clarify the standards by which academic honesty and academically honorable conduct are to be judged. A non-exhaustive list provided in the Policy illustrates the kinds of infractions that may occur, such as Plagiarism, Cheating on Examinations (including tests and quizzes), Unauthorized Collaboration, Falsification, and Multiple Submissions. Details that clarify each of these infractions are provided in the Policy. Students are strongly encouraged to review and abide by this Policy on Academic Honesty.

Furthermore, any attempt made by a student to intentionally mislead an instructor in the determination of a grade will also be considered as cheating. Cheating includes any attempt to defraud, deceive, or mislead the instructor in arriving at an honest grade assessment. Cheating of any kind may result in a penalty ranging from a grade of zero for the work in question to a
CONDUCT DURING CLASS
The online or face-to-face classroom is meant to be a positive, academically stimulating environment that promotes student learning. Students are expected to conduct themselves with utmost self-respect and dignity. You are expected to be considerate of the rights of the other students so as not to disrupt their ability to learn or my ability to teach. This expectation applies to in-class use of cell phones and laptops, peer-to-peer side talk, participation in class discussions, and more. Students who engage in disruptive actions may be asked to leave the class or be excluded for cause.

During testing, NO communication between students is allowed without the expressed permission of the testing proctor or Instructor. Use of unauthorized formula sheets and/or notes during testing will be considered as cheating.

Unless specifically authorized by the instructor, the following are examples of cheating or plagiarism. This is not an exhaustive list.

A. On any examination, test, or quiz:
   1. Looking at or copying from another student's work.
   2. Allowing another student to look at or copy your work.
   3. Exchanging information with another student.
   4. Speaking or whispering. (You may speak to the instructor at any time)
   5. Opening a textbook or notebook.
   6. Looking at notes, on paper, using electronic devices (e.g. phones, PDA or similar devices) and other formats.

B. On homework or other out-of-class assignments:
   1. Copying work or answers from another student.
   2. Copying work or answers from a book.
   3. Having another person do work for you.
   4. Allowing another student to use your work as his or her own.

C. For late work or tests:
   * Providing false information or false documents in order to be allowed to make up a missed test, quiz, or homework.

Disability Services
Disability Services
Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which accommodations are sought.

TITLE X
TITLE X
GSU-Perimeter College seeks to provide an environment that is free of bias, discrimination, and harassment. If you have been the victim of sexual harassment/misconduct/assault, we encourage you to report this. If you report this to a faculty member, he or she must notify one of our college's Assistant Title IX Coordinators / Student Deans about the basic facts of the incident (you may choose whether you or anyone involved is identified by name). For more information please refer to our sexual misconduct website – http://depts.gpc.edu/gpcmisconduct/index.html

Incomplete Course Grade
"Incomplete" (I) Course Grade:
A grade of “Incomplete” or an "I" will only be given for documented emergencies that occur near the end of the semester. The student must be passing to receive an "I" grade and must fill out the proper form, specify the missed work, and attach any required documentation (such as a hospital record).

Inclement Weather
Inclement Weather
If the College is closed due to inclement weather or other reasons, any scheduled tests, quizzes or examination during that period will be conducted during the next available full class period in the order of the initial schedule.

Statement of Non-Discrimination
Statement of Non-Discrimination
Georgia Perimeter College supports the Civil Rights Act of 1964, Executive Order #11246, Title IX of the
Educational Amendments of 1972, Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act. No person shall, on the basis of age, race, religion, color, gender, sexual orientation, national origin or disability, be excluded from participation in, or be denied the benefits of, or be subjected to discrimination under any program or activity of the college.

Any individual with a grievance related to the enforcement of any of the above provisions should contact the Assistant Director of Human Resources, Ombudsperson.

EQUAL OPPORTUNITY STATEMENT
No person shall, on the basis of age, race, religion, color, gender, sexual orientation, national origin or disability, be excluded from participation in, or be denied the benefits of, or be subjected to discrimination under any program or activity of Georgia Perimeter College.

AFFIRMATIVE ACTION STATEMENT
Georgia Perimeter College adheres to affirmative action policies to promote diversity and equal opportunity for all faculty and students.

Tobacco and Smoke-Free Campus Policy
The University System of Georgia (USG) Board of Regents adopted a tobacco and smoke-free campus policy to make USG 100% tobacco free effective October 1, 2014. All faculty, staff, students, visitors, vendors, contractors, and all others are prohibited from using any tobacco products while on GSU PC property. “Tobacco Products” is defined as cigarettes, pipes, cigars, all forms of smokeless tobacco, clove cigarettes and other smoking devices that use tobacco such as hookahs or simulate the use of tobacco such as electronic cigarettes. Violations of the smoking policy will be handled under the GSU Student Code of Conduct.

Section Instructor: Martin Okafor
E-mail: mokafor@gsu.edu

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