



## Stony Point High School

### IB Diploma Programme Course Syllabus

IB Biology SL/HL

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#### I. Course Description:

“Biology is the study of life. The first organisms appeared on the planet over 3 billion years ago and, through reproduction and natural selection, have given rise to the 8 million or so different species alive today. Estimates vary, but over the course of evolution 4 billion species could have been produced. Most of these flourished for a period of time and then became extinct as new, better adapted species took their place. There have been at least five periods when very large numbers of species became extinct and biologists are concerned that another mass extinction is under way, caused this time by human activity. Nonetheless, there are more species alive on Earth today than ever before. This diversity makes biology both an endless source of fascination and a considerable challenge.” - IB Biology Diploma Program, First Assessment 2016

#### II. Prior Learning

It is expected that students enrolled in IB Biology SL have completed coursework in biology and chemistry, as well as already having completed or currently enrolled in Physics. Accelerated Science I and II also counts, but is not required. Students in IB Biology HL are expected to know the material from the year one and should be prepared for only a brief review before moving on to new material.

#### III. Course Aims and Objectives

At one end of the scale is the cell, its molecular construction and complex metabolic reactions. At the other end of the scale, biologists investigate the interactions that make whole ecosystems function. IB Biology follows this path as students learn about cell and molecular biology, genetics, human physiology, evolution and biodiversity, and ecology. During the SL and HL year one, students will cover options over biotechnology and bioinformatics as well as ecology and conservation. During the HL year students will cover additional higher level topics as well as the neurobiology and behavior and human physiology options. This course is designed to help students develop their skills of independent inquiry and scientific collaboration and to become critically aware, as global citizens, of the ethical implications, possibilities, and limitations of science and technology. Students will participate in an independent student created, designed, and driven experimental investigation as well as the Group IV project, bringing together all disciplines within the investigative sciences.

The aims for group 4 (Sciences) enable students, through the overarching theme of the Nature of science, to:

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology  
apply and use a body of knowledge, methods and techniques that characterize science and technology

3. develop an ability to analyse, evaluate and synthesize scientific information
4. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
5. develop experimental and investigative scientific skills including the use of current technologies
6. develop and apply 21st century communication skills in the study of science
7. become critically aware, as global citizens, of the ethical implications of using science and technology
8. develop an appreciation of the possibilities and limitations of science and technology
9. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

#### **IV: How the Course will Address Theory of Knowledge (TOK)**

Connections will be made throughout the course to theory of knowledge questions. These will be addressed through class discussions, journal writing, book club readings, current events, and other projects. TOK in biology focuses heavily on ethics and the nature of scientific research.

#### **V: How the Course will Address CAS (Creativity, Action, Service)**

Creativity, action, service (CAS) is at the heart of the Diploma Programme. The emphasis in CAS is on helping students to develop their own identities, in accordance with the ethical principles embodied in the IB mission statement and the IB learner profile. It involves students in a range of activities alongside their academic studies throughout the Diploma Programme. The three strands of CAS are Creativity (arts, and other experiences that involve creative thinking), Action (physical exertion contributing to a healthy lifestyle) and Service (an unpaid and voluntary exchange that has a learning benefit for the student). CAS opportunities in Biology are often related to environmental conservation (e.g., Monarch Garden, Campus Cleanup, Tree plantings in national forests), or helping other students learn (e.g., tutoring underclassmen in Biology for the EOC).

#### **VI: How the Course will Address Approaches to Learning**

Both SL and HL Biology courses are developed around the ATL principles set forth by the IB. The ATL are as follows:

Thinking skills - Students will explore the living world from multiple vantage points and perspectives and apply their knowledge to a variety of applications.

Communications skills - Students will communicate their ideas both verbally and through written form. Emphasis will be put on writing styles that will help students be successful on papers 2 and 3.

Social skills - Students will interact with each other every class period through discussion, group projects, collaborative work, and peer review.

Self-management skills - Students will take charge of their own learning. They will be responsible for covering material outside of class, asking questions to expand their understanding, and making connections between the ideas within and outside of the curriculum.

Research skills - Students will participate in a variety of scientific investigations, building their inquiry skills. Students will use these skills in order to complete the IA for biology as well as other inquiry labs and research projects.

#### **VII: How the Course will Address Approaches to Teaching**

We will teach the course using the approaches to teaching as defined by the IB. This means that the course will be: based on inquiry, focused on conceptual understanding, developed in local and global contexts, focused on effective teamwork and collaboration, differentiated to meet the needs of all learners, and informed by formative and summative assessment.

### VIII: How the Course will Address the Learner Profile

The biology course is closely linked to the IB learner profile. By following the course, students will have engaged with the attributes of the IB learner profile. For example, the requirements of the internal assessment provide opportunities for students to develop every aspect of the profile. For each attribute of the learner profile, a number of references from the Group 4 courses are given below.

#### Learner Profile Attributes

<b>Inquirers</b>	Aims 2 and 6—Practical work and internal assessment
<b>Knowledgeable</b>	Aims 1 and 10—international-mindedness links Practical work and internal assessment
<b>Thinkers</b>	Aims 3 and 4—theory of knowledge links Practical work and internal assessment
<b>Communicators</b>	Aims 5 and 7—external assessment Practical work and internal assessment
<b>Principled</b>	Aims 8 and 9—Practical work and internal assessment. Ethical behaviour/practice , academic honesty
<b>Open-Minded</b>	Aims 8 and 9—international-mindedness links Practical work and internal assessment, the group 4 project
<b>Caring</b>	Aims 8 and 9—Practical work and internal assessment, the group 4 project, ethical behaviour/practice
<b>Risk-Takers</b>	Aims 1 and 6—Practical work and internal assessment, the group 4 project
<b>Balanced</b>	Aims 8 and 10—Practical work and internal assessment, the group 4 project and field work
<b>Reflective</b>	Aims 5 and 9--Practical work and internal assessment, the group 4 project

### IX: IB Biology Assessment Objectives

Demonstrate knowledge and understanding of:

- facts, concepts and terminology
- methodologies and techniques
- communicating scientific information.

Apply:

- facts, concepts and terminology
- methodologies and techniques
- methods of communicating scientific information.

Formulate, analyse and evaluate:

- hypotheses, research questions and predictions
- methodologies and techniques
- primary and secondary data
- scientific explanations.

Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations

## **Internal and External Assessments**

### **Internal Assessment: 20%**

The internal assessment requirements are the same for biology, chemistry and physics. The internal assessment, worth 20% of the final assessment, consists of one scientific investigation. The individual investigation should cover a topic that is commensurate with the level of the course of study. Student work is internally assessed by the teacher and externally moderated by the IB. The performance in internal assessment at both SL and HL is marked against common assessment criteria, with a total mark out of 24.

The internal assessment task will be one scientific investigation taking about 10 hours and the write-up should be about 6 to 12 pages long. Investigations exceeding this length will be penalized in the communication criterion as lacking in conciseness.

The internal assessment will not be included in the class grade as it is graded by an external marker. The IA will be assessed in the categories of: Personal Engagement (8%), Exploration (25%), Analysis (25%), Evaluation (25%), and Communication (17%).

Labs and Practicals completed throughout the year will prepare students for the IA, and will be graded using the same mark scheme so that students become comfortable with the expectations.

### **External Assessments: 80%**

There are three exams for both SL and HL students that will be taken in early May (exact dates TBD)

#### **Paper 1: 20% (No calculators) Objectives 1, 2, 3**

SL - 45 minutes / 30 Multiple Choice on core material

HL - 1 hour / 40 Multiple Choice on core and AHL material

#### **Paper 2: Calculators Objectives 1, 2, 3**

SL (40%) - 1 hour 15 minutes / short answer and extended response on core material. Students will write 1 extended response out of two choices

HL (36%)- 2 hours 15 minutes / short answer and extended response on core and AHL material. Students will write 2 extended responses out of three choices

#### **Paper 3: Calculators Objectives 1, 2, 3 \*\*\* NO PAPER 3 MAY 2021**

Section A: 2 to 3 questions on experimental skills similar to prescribed labs

Section B: short answer and extended response on 1 option out of 4

SL (20%) - 1 hour

HL (24%) - 1 hour 15 minutes

## **X: Grading Policy and Scale**

Major Grades: 40% (at least 2 per 6 week period)

ex: Tests and Quizzes, Major Projects, lab reports

Minor Grades: 60%

ex. Daily work, worksheets, homework, lab prep

### **Homework:**

You will be given a variety of homework assignments (textbook reading, online presentations, videos, packets). It is your responsibility to complete these assignments, ensuring that you understand the material. The best way to accomplish this is through note taking.

If you need help understanding any of the homework, come in for tutorials or contact me with any questions. I am here to help you understand the material and work on ways to improve your note taking.

### **Lab Assignments:**

These assignments **must be turned in on time** (*i.e. at the beginning of your class on the due date*). Late labs will be deducted 10 points per day.

Participation in a lab also requires proper attire and your lab notebook. Lack of either of these will result in your inability to participate in the lab.

Some lab activities cannot be made up, but you are still responsible for completing the lab questions or write up. If you are absent on a lab day, you are expected to come see me so I can direct you where to get the lab data from in order to complete the lab and turn it in on the assigned day.

### **Tests:**

It is important that you keep up with your assignments and work on studying a little bit each day. There is too much information for you to try to “cram” all of your studying into a few hours before a test. You will be more likely to retain information if you review and study your notes and textbook a little every day!

Tests are composed of IB exam questions and IB style exam questions.

Tests will be time limited just as it is on the IB exam and MC and FRQ will be timed separately

**Tests will be graded using an IB markscheme (1-7), and gradebook grades will be scaled according to the equivalent passing score (4=passing)**

Test questions will be based on class notes, assignments, labs, and your textbook. We may or may not directly cover every single item on a test. It is your responsibility to carefully complete assignments, assigned readings and video notes.

After a test is graded and discussed in class, students are welcome to make arrangements to look at their test mistakes in greater detail. Tests will not be released to students.

If you are absent on the day of a test, you are expected to see me about a make-up date, the day you return to class.

**XI: Sample Exam Questions**

Sample Question from Paper 1

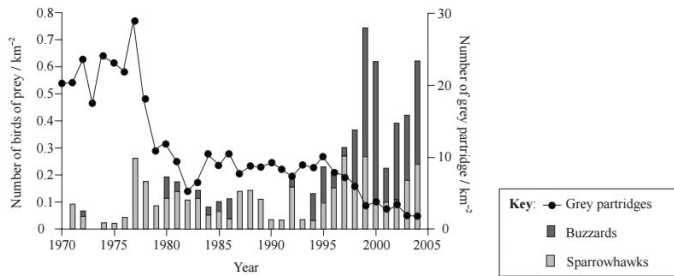
1. What can limit increases in population size?
- I. Decrease in prey
  - II. Decrease in parasites
  - III. Increase in predators

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

2. Which events occur during the G1 phase and S phase of the cell cycle?

	G <sub>1</sub> phase	S phase
A.	DNA replicates	cell grows
B.	mitosis begins	cell divides
C.	cell divides	mitosis begins
D.	cell grows	DNA replicates

Sample Questions from Paper 2

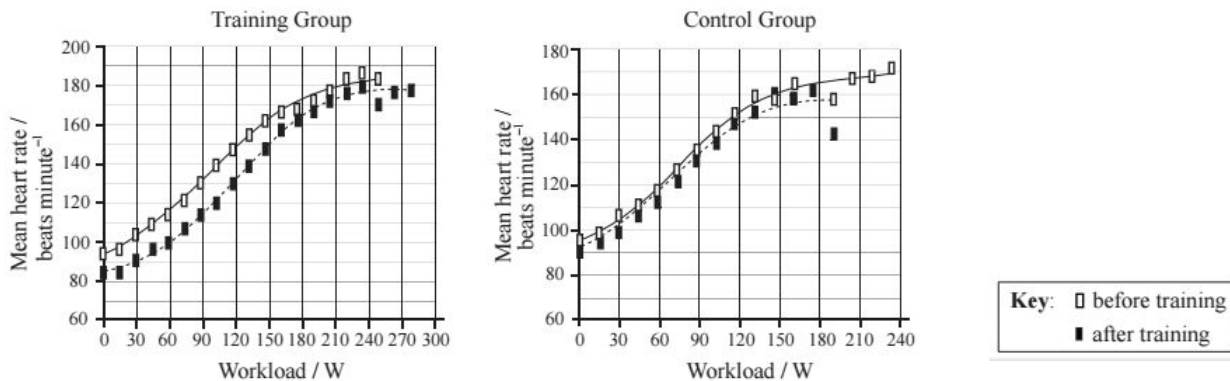


- 1.
- (a) Outline the trends, over the period of time shown in the graph, in the number of grey partridges, buzzards and sparrowhawks.
- Grey partridges: .....
- Buzzards: .....
- Sparrowhawks: .....
2. (a) Explain why DNA must be replicated before mitosis and the role of helicase in DNA replication. [4]
- (b) Explain how the base sequence of DNA is conserved during replication. [5]
- (c) Describe the events that occur during mitosis. [9]

### Sample Questions from Paper 3

**B1.** A study was carried out to assess the effects of high-intensity interval training on heart rate. 20 subjects were randomly assigned to two groups: training and control. They underwent a test in which the exercise became harder and harder until they reached the point of exhaustion (progressive incremental test). The training group then performed nine sessions of high intensity interval training on a cycle ergometer during three weeks (1 minute at 130% of maximal aerobic work rate with 1 minute rest intervals until they felt they were at the point of exhaustion). The control group did not do any training. Both groups then repeated the progressive incremental test.

The graphs below show the mean heart rate curves during progressive incremental tests before and after training.



- State three factors that would have to be considered when selecting the subjects used in this study.
- Describe the relationship between workload and heart rate shown by the graphs.
- (i) Calculate the change in mean heart rate at a workload of 90W in the training group before and after three weeks of training.  
(ii) Deduce the effect of training on heart rate.

### XII: Course Sequence

The following is a brief overview of what will be taught in IB Biology SL and HL years. A more detailed agenda will be available on your teacher's website. Some units may change in order as the year progresses.

#### IB Biology SL/HL Year 1

Fall	Spring
Molecular Biology	Ecology
Cells	Human Physiology
Genetics	
Evolution & Biodiversity	

#### IB Biology HL Year 2

Fall	Spring
Animal Physiology	Plant Biology
Nucleic Acids	Metabolism, Cell Respiration and Photosynthesis
Genetics and Evolution	

### XIII: IA Checkpoint dates and Deadlines

Failure to meet checkpoints will be communicated with the IB coordinator. All checkpoint submissions will be turned in electronically on the date listed below, regardless of A/B schedule. Rough draft and final submission dates are recorded on the SPHS IA Calendar.

IA Topics/Proposals	Intro and Design Rough Draft	Full Rough Draft	Final Submission
Sept 3rd	Oct 16th	Jan 13th	Feb 16-22

Students will also have 1 meeting per semester with the teacher to discuss: Results and Analysis (Fall) and Rough Draft (Spring)

### XIV: Stony Point Academic Honesty Policy

***Remember, you do not have control over a lot of things in life, but you do have control over your integrity. Violating academic integrity in any way, however small, is a choice that you make.***

Students will be expected to follow the Stony Point High School Academic Honesty Policy as well as other agreed upon guidelines. In addition to the official policy, here are some guidelines to help students define cheating and plagiarism. **Students should report any suspected violations to these policies immediately.**

#### Cheating

- Looking off another person's exam for answers
- Collaborating with others on work that is supposed to be completed independently
- Copying another student's homework, written assignments, examination answers, electronic media, or other data.**
- Assisting or allowing someone else to cheat.
- Willfully copying or allowing class assignments to be copied and falsely presenting them as your own work and effort.
- Using unauthorized materials such as books, notes, or "cheat" sheets to answer examination questions
- Using or consulting electronic equipment including cell phones, PDA's, IPODS, etc. during a testing situation.
- Being informed or informing, verbally or otherwise, of test questions or answers either during or prior to the testing situation.

#### Plagiarism

- Representing the ideas, expressions, or materials of another without due credit.
- Paraphrasing or condensing ideas from another person's work without proper citation.
- Failing to document direct quotations and paraphrases with proper citation.
- Submitting a paper purchased from a research or term paper service, including the Internet.
- Undocumented Web source usage.

#### Intervention Policy

IA Checkpoints: While the IA itself will not contribute to the course grade, failure to meet the given checkpoints will result in an intervention plan including a meeting between some or all of the following: student, teacher, IB Coordinator, and parents/guardians.



Test Scores: **Students will be expected to maintain 70 on tests given in class.** If the student scores below this level on any two assessments in the same semester, they will be required to complete tutoring as laid out by an intervention plan developed by some or all of the following: student, teacher, IB coordinator, and parents/guardians.

### **XV: Extended Essay**

The extended essay is an in-depth study of a focused topic chosen from the list of available Diploma Programme subjects for the session in question. It is intended to promote academic research and writing skills, providing students with an opportunity to engage in personal research in a topic of their own choice, under the guidance of a supervisor (an appropriately qualified member of staff within the school). This leads to a major piece of formally presented, structured writing, in which ideas and findings are communicated in a reasoned and coherent manner, appropriate to the subject chosen. It is mandatory that all students undertake three reflection sessions with their supervisor, which includes a short, concluding interview, or viva voce, with their supervisor following the completion of the extended essay. Biology is the science that deals with living organisms and life processes. A biology EE should incorporate biological theory and emphasize the essential nature of this subject. For more information regarding topic choice and requirements for an EE in biology please visit your teacher's website.

### **XVI: Classroom Policies and Procedures**

#### **Supplies Needed:**

1. Notebook- size and style up to your discretion. Used for taking notes
2. Binder- Used for organizing handouts and homework assignments
3. Internet access (You must let me know as soon as possible if this is an issue, if not it will be assumed that you have access)
4. A pen and a pencil for each class
5. Class Supplies \_\_\_\_\_

#### **Where to find your assignments:**

Agendas, curriculum guides, and class materials can be found on your teacher's website and Schoology.

This information will be updated frequently, so make sure to check it often. You are responsible for all assignments given in class or via Remind.

#### **Absence Policy:**

***If you know about your absence ahead of time*** (i.e school trips, college visits, planned trips with family)

You are expected to keep up with the agenda. This means that you will need to talk with me before your absence to discuss the work you are going to miss. Work will be due the day you return, including homework due the day of your return.

If you will be missing a test or quiz, you are expected to make arrangements with me for a makeup time **BEFORE you leave**. You will not necessarily be required to take the assessment before you leave, but you need to set a time/date for the test.

***If you are sick or miss class unexpectedly because of an emergency,***

I expect you to turn your work in that was assigned for the day you were absent **ON THE DAY YOU RETURN** unless you have contacted me ahead of time and made alternate arrangements.

Any work assigned during your absence is your responsibility to get and complete within the one block per day absent policy at Stony Point High School.

Missing the class before a test **DOES NOT** excuse you from taking the test, unless there are extenuating circumstances that you notify me about AHEAD OF TIME. Not kidding.

If you are absent on the day of the test, it is your responsibility to see me the next block that you are in school to schedule a make-up day. The test must be made up **within one week** of the absence.

Labs are a crucial part of this course. It is very important to not miss lab days. If you miss a lab you are not guaranteed to be able to make up the lab due to restrictions on the quantity of supplies. It is possible that you may be able to complete the lab with another class or during a make-up session. If this is not the case, you will earn an "excused" grade for the lab.

### Retake/Missing Assignment Policy

*"Science, my boy, is made up of mistakes, but they are mistakes which it is useful to make, because they lead little by little to the truth."* -J. Verne, *Journey to the Center of the Earth*

Students are allowed to retake **one** assignment up to a 70 throughout a six week period. Please come see me about scheduling this retake.

### Communication

Please feel free to contact me through email any time you have questions. Another way to stay connected is through Remind. Through this service I will be able to contact you and your student through text message and/or email with reminders about class. The app/website also has a chat feature which allows direct communication during set hours. To sign up for this service:

Text \_\_\_\_\_ to \_\_\_\_\_ or access online through my website.



## Student Safety Contract

School Name \_\_\_\_\_

Teacher \_\_\_\_\_

### PURPOSE

Science is a hands-on laboratory class. However, science activities may have potential hazards. We will use some equipment and animals that may be dangerous if not handled properly. Safety in the science classroom is an important part of the scientific process. To ensure a safe classroom, a list of rules has been developed and is called the Science Safety Contract. These rules must be followed at all times. Additional safety instructions will be given for each activity.

No science student will be allowed to participate in science activities until this contract has been signed by both the student and a parent or guardian.

### SAFETY RULES

1. Conduct yourself in a responsible manner at all times in the science room. Horseplay, practical jokes, and pranks will not be tolerated.
2. Follow all written and verbal instructions carefully. Ask your teacher questions if you do not understand the instructions.
3. Do not touch any equipment, supplies, animals, or other materials in the science room without permission from

12. Consider all chemicals used in the science room to be dangerous. Do not touch or smell any chemicals unless specifically instructed to do so.
13. Handle all animals with care and respect.
  - a. Open animal cages only with permission.
  - b. Never handle any animals when the teacher is out of the room.
  - c. Do not take animals out of the science room.
  - d. Do not tease or handle animals roughly.
  - e. Keep animals away from students' faces.
  - f. Wear gloves when handling animals.
  - g. Report any animal bite or scratch to the teacher immediately.
14. Always carry a microscope with both hands. Hold the arm with one hand; place the other hand under the base.
15. Treat all preserved specimens and dissecting supplies with care and respect.
  - a. Do not remove preserved specimens from the science room.
  - b. Use scalpels, scissors, and other sharp

### AGREEMENT

I, \_\_\_\_\_, (student's name) have read and understand each of the above safety rules set forth in this contract. I agree to follow them to ensure not only my own safety but also the safety of others in the science classroom or laboratory. I also agree to follow the general rules of appropriate behavior for a classroom at all times to avoid accidents and to provide a safe learning environment for everyone. I understand that if I do not follow all the rules and safety precautions, I will not be allowed to participate in science activities.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

Dear Parent or Guardian:

We feel that you should be informed of the school's effort to create and maintain a safe science classroom/ laboratory environment. Please read

experiments when the teacher is out of the room.

5. Never eat, drink, chew gum, or taste anything in the science room.
6. Keep hands away from face, eyes, and mouth while using science materials or when working with either chemicals or animals. Wash your hands with soap and water before leaving the science room.
7. Wear safety glasses or goggles when instructed. Never remove safety glasses or goggles during an experiment. There will be no exceptions to this rule!
8. Keep your work area and the science room neat and clean. Bring only your laboratory instructions, worksheets, and writing instruments to the work area.
9. Clean all work areas and equipment at the end of the experiment. Return all equipment clean and in working order to the proper storage area.
10. Follow your teacher's instructions to dispose of any waste materials generated in an experiment.
11. Report any accident (fire, spill, breakage, etc.), injury (cut, burn, etc.), or hazardous condition (broken equipment, etc.) to the teacher immediately.

always cut away from your body.

- d. Report any cut or scratch from sharp instruments to the teacher immediately.
16. Never open storage cabinets or enter the prep/storage room without permission from the teacher.
17. Do not remove chemicals, equipment, supplies, or animals from the science room without permission from the teacher.
18. Handle all glassware with care. Never pick up hot or broken glassware with your bare hands.
19. Use extreme caution when using matches, a burner, or hot plate. Only light burners when instructed and do not put anything into a flame unless specifically instructed to do so. Do not leave a lit burner unattended.
20. Dress properly—long hair must be tied back, no dangling jewelry, and no loose or baggy clothing. Wear aprons when instructed.
21. Learn where the safety equipment is located and how to use it. Know where the exits are located and what to do in case of an emergency or fire drill.

activities unless this contract is signed by both the student and parent/guardian and is on file with the teacher. Your signature on this contract indicates that you have read this Science Safety Contract, reviewed it with your child, and are aware of the measures taken to ensure the safety of your son/daughter in the science classroom.

\_\_\_\_\_  
Parent/Guardian Signature

\_\_\_\_\_  
Date

**Important questions:**

Does your child wear contact lenses?

Y or N

Is your child color blind?

Y or N

Does your child have any allergies?

Y or N

If so, please list:

## IB Biology Syllabus Contract

### Student

I \_\_\_\_\_ have read the course handbook and understand what is  
(Print Student Name)

required of me in this course. I have read the honor code, late work and grading policies of the handbook and understand that I am expected to follow each policy.

\_\_\_\_\_  
(Student Signature)

Date \_\_\_\_\_

### Parent/Guardian

I \_\_\_\_\_ the parent/guardian of \_\_\_\_\_  
(Print Name) (Print Student Name)

have read the course handbook and understand what is required of my child in this course. I have read the honor code, late work and grading policies section of the handbook and understand that my child is expected to follow each policy.

\_\_\_\_\_  
(Parent/Guardian Signature)

Date \_\_\_\_\_

Parent/Guardian Email: \_\_\_\_\_

Parent/Guardian Phone Number: \_\_\_\_\_

Is there anything about your student that you feel like I should know to make this a successful school year?