Brain and Behavior, MAP-UA.306
Mike Hawken
Spring 2012

This is a MAP course which satisfies the Natural Science II requirement. The lectures are scheduled for 2:00-3:15, Tuesdays and Thursdays, Room 207 in the Silver Building.

Attendance at lectures is mandatory

Required Text: Biological Psychology Breedlove et al. Sinauer, 2010, Sixth Edition

Lab manual and folder for assignments is required

Testing: There will be 2 exams (midterm and final).

Labs: Location: Room 201 Silver Building. The purpose of the labs is to give you hands-on experience related to the class material, and provide a deeper understanding of the material than is likely from the lectures alone. They also give you an opportunity to learn about how science works. You will have to write up each lab to catalog the lab experience, record notes, and express ideas. The particulars of your lab notebooks will be discussed in the first lab meeting (in the second week of the class). Lab sections are 1 hour and 40 minutes each. Some labs will involve the use of animal tissue or living animals. Lab reports will be handed in at the end of lecture on Thursday.

Class work and home work: Each week you will be given readings, podcasts or movies on topics of interest from the media.. During the lectures, once each 2 weeks or so we will have short quizz on the readings or media assignments. You will be give more information about the class work and home work during lectures.

Grading: Grades will be based on performance in all aspect of the class. Breakdown: Exams 50% (25% each for Midterm and Final), Labs 30%, Class/homework quizzes 20%.

Lab Times and TA's: You must be registered for a lab as well as the lecture. There are six lab sessions for this course.

Lab Sessions
Wednesday 11:00 – 12:40
Wednesday 1:00 – 2:40
Wednesday 3:00 – 4:40
Wednesday 5:00 – 6:40
Thursday 9:00 – 10:40
Thursday 11:00 – 12:40

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Brain & Behavior Syllabus
MAP-UG.0306

Instructor Mike Hawken
Spring 2012

Week 1 **INTRODUCTION**

1/24	Lecture 1	Brain and Biology of Behavior – early influences *Reading: Chapter 1, pp 1 –19*
1/26	Lecture 2	Understanding the Brain – later influences *Reading: Chapter 1, pp 1 – 19*

Week 2

2/1	Lab 1	Introduction to the Laboratory: The Scientific Method – Developing a Hypothesis
1/31	Lecture 3	Building a Brain: Neurons and Glia - Cells and Synapses, structure, properties, cell types *Reading: Chapter 2, pp 23-56* **CELLS and SYNAPSES**
2/2	Lecture 4	The Language of Neurons: Electrical Properties - resting potential, synaptic transmission, integration, graded potentials, action potentials *Reading: Reading: Chapter 3, pp 57 – 85*

Week 3

2/8	Lab 2	Organization of the Brain I: Sheep Brain Dissection
2/7	Lecture 5	Synaptic transmission; transmitter release and receptors *Reading: Chapter 4, pp 87 – 116*
2/9	Lecture 6	Synaptic transmission: neurotransmitters and neurochemical modulation *Reading: Chapter 4, pp 87 – 116*

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Week 8 **Spring Break (3/14 – 3/19)**

Week 9

3/21	Lab 5	Electrical Potentials in Neurons
3/20	Lecture 14	Motor Systems II: Control of movements, walking, eye and head movements
		Reading: Chapter 11, pp 318 – 348
		SEXUAL BEHAVIOR and RHYTHMS
3/22	Lecture 15	Sexual Behavior
		Reading: Chapter 12, pp 351 – 382

Week 10

3/28	Lab 6	Perception I: Reaction Time
3/27	Lecture 16	Neuroendocrinology - chemical control of temperature, fluids and eating
		Reading: Chapter 13, pp 385 – 412
3/29	Lecture 17	Sleep and Waking rhythms, dreaming, and cycles controlled by the brain
		Reading: Chapter 14, pp 415 – 442

Week 11

4/4	Lab 7	Perception II: Vision
		DRUGS and ADDICTION
4/3	Lecture 18	Drugs and Behavior
		Reading: Chapter 4, pp 94 – 116
4/5	Lecture 19	Drugs and the Brain
		Reading: Chapter 4, pp 94 – 116

Week 12

4/11	Lab 8	Perception III: Somatic Sensation
		COGNITIVE SYSTEMS
4/10	Lecture 20	Learning and Plasticity-developmental processes and adult learning
		Reading: Chapter 17, pp 511– 529

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Introduction:

The study of the brain and behavior has intrigued some of the greatest minds over the last 2000 years.

What have we learned over this period about how behavior depends on the brain?

Signals and Brain Structure:

Chemistry and biology of neurons.

The organization of neurons and of brain.

How neurons send messages around the brain.

How neurons talk to each other and in groups, neuronal networks.

Sensory Signals, Perception & Action (Moving around):

How light, pressure, and chemical substances are detected by the body.

How the signals from the senses are turned into perceptions we call seeing, hearing, touching, tasting, smelling and maintaining balance.

Moving around:

What do we need to move around, muscles and their biology.

How do the signals from the brain control the muscle groups and joints to make different kinds of movements.

Sexual Behavior and Rhythms

There are lots of behaviors that have different time cycles.

Many of the patterns or rhythms are maintained across species. How are these patterns controlled by the brain?

Cognitive Behaviors:

What parts of the brain are used for language, thought, decision making. How are memories made, stored and retrieved by the brain.

Drugs, Behavior and the Brain:

Drugs, prescription and illicit, can have powerful effects on behavior. How do these drugs interact with the brain to exert their effects. Can we understand anything about addiction from studying the effects of drugs on the brain?

Learning and Plasticity:

Young children acquire many new behaviors during their early life. How does the brain change during the early years? Can these changes be influenced by practice and training or are they a result of a genetic program?

Emotion:

Do we have separate brain regions that influence how we feel when we are angry, fearful, happy? What is the chemistry that influences these feelings? How do drugs affect the way we feel, how do they affect our perceptions and our movements?

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Academic Guidelines for Students
Morse Academic Plan, College of Arts and Science

To help foster common academic expectations among students and instructors, the following guidelines for MAP courses are offered to students. While these represent minimum expectations across the curriculum, individual faculty members may set additional course requirements. Students should therefore consult the course syllabus for details of policies in each class.

Attendance
Inasmuch as students have voluntarily sought admission to the University, they are expected to attend all class meetings, including all lectures and all meetings of associated recitation, workshop, or laboratory sections. Students may be excused for documented medical or personal emergency and will receive reasonable accommodation for the observance of religious holidays. In these cases, they should contact their instructors in advance or, in cases of emergency, as soon as is practicable. Students are responsible for making up any material or assignments they miss.

Classroom Decorum
The classroom is a space for free and open inquiry and for the critical evaluation of ideas, and it should be free of personal prejudice. Students and instructors alike have an obligation to all members of the class to create an educational atmosphere of mutual trust and respect in which differences of opinion can be subjected to deliberate and reasonable examination without animus.

As a matter of courtesy to their fellow students and instructors, students should arrive at class promptly, prepared and ready to participate. Students are reminded particularly to shut off all cellular telephones and pagers and, except in cases of emergency, to remain in the classroom for the duration of the lecture or section meeting. If it is necessary to leave or enter a room once class has begun, students should do so quietly and with as little disruption as possible. Under University policy, disruptive classroom behavior may be subject to faculty review and disciplinary sanction.

Note that it is within the discretion of individual faculty members to establish other classroom policies such as prohibiting the use of laptop computers.

Completion of Assignments
Students are expected to submit course work on time and to retain copies of their work until a final grade has been received for the course. Instructors are not obliged to accept late work and may assign a failing or reduced grade to such assignments.

Students who encounter sudden and incapacitating illness or an other comparably grave circumstance that prevents them from completing the final examination or assignment in a course may request a temporary mark of Incomplete from the course instructor. To receive an Incomplete, students must have completed all other requirements for the course, including satisfactory attendance, and there must be a strong likelihood they will pass the course when all work is completed.

Questions and Concerns
Up-to-date course information is available on the MAP website: http://map.cas.nyu.edu. Questions, concerns, comments, and feedback may be directed to the following members of the MAP staff, located in 903 Silver Center, 212-998-8119. Complaints will remain confidential.

Director:	Prof. Joy Connolly	morse.plan@nyu.edu
Associate Director for the FCC:	Prof. Vincent Renzi	map.fcc@nyu.edu
Associate Director for the FSI:	Prof. Trace Jordan	map.fsi@nyu.edu
Department Administrator:	Mr. Daniel Holub	daniel.holub@nyu.edu

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Statement on Academic Integrity
Morse Academic Plan, College of Arts and Science

As a student at New York University, you have been admitted to a community of scholars who value free and open inquiry. Our work depends on honest assessment of ideas and their sources; and we expect you, as a member of our community, likewise to maintain the highest integrity in your academic work. Because of the central importance of these values to our intellectual life together, those who fail to maintain them will be subject to severe sanction, which may include dismissal from the University.

Plagiarism consists in presenting ideas and words without acknowledging their source and is an offense against academic integrity. Any of the following acts constitutes a crime of plagiarism.

- Using a phrase, sentence, or passage from another person's work without quotation marks and attribution of the source.
- Paraphrasing words or ideas from another's work without attribution.
- Reporting as your own research or knowledge any data or facts gathered or reported by another person.
- Submitting in your own name papers or reports completed by another.
- Submitting your own original work toward requirements in more than one class without the prior permission of the instructors.

Other offenses against academic integrity include the following.

- Collaborating with other students on assignments without the express permission of the instructor.
- Giving your work to another student to submit as his or her own.
- Copying answers from other students during examinations.
- Using notes or other sources to answer exam questions without the instructor's permission.
- Secreting or destroying library or reference materials.
- Submitting as your own work a paper or results of research that you have purchased from a commercial firm or another person.

Particular emphasis is placed on the use of papers and other materials to be found on the World-Wide Web, whether purchased or freely available. In addition to having access to the same search engines as students, faculty also have at their disposal a number of special websites devoted to detecting plagiarism from the web.

Plagiarism and other cases of academic fraud are matters of fact, not intention. It is therefore crucial that you be diligent in assuring the integrity of your work.

- Use quotation marks to set off words that are not your own.
- Learn to use proper forms of attribution for source materials.
- Do your own original work in each class, without collaboration, unless otherwise instructed.
- Don't use published sources, the work of others, or material from the web without attribution.
- For further information, consult the College of Arts and Science website on academic integrity at http://cas.nyu.edu/page/ug.academicintegrity.

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Why Science? A Guide for Students
Morse Academic Plan, College of Arts and Science

1. Science is important, and everyone can do it.

Many people (e. g., university students) think they don't like science, or they are not good at science, or that science is only for geeks. Many people also feel that science is irrelevant to their lives. Nothing could be further from the truth. In fact, people who do not "like" science "do" science all the time.

Remember when you got up this morning? You gathered and processed a large amount of information (considered whether you were hungry, thirsty, in need of caffeine; remembered what you wanted to do today; checked the time). You then calculated when you should leave your apartment in order to stop for coffee and still make it to class. Next you tested this calculation by leaving five minutes later than you should. If you had to run to make it to class, you confirmed that your original calculation was good or bad, which might affect when you leave the next time. During the process of observing, calculating, and testing, you were using scientific tools.

We constantly make decisions based on gathered information. Some decisions are simple. Others are more complicated and can dramatically affect your life, or the lives of everyone around you. For example:

- Who should I vote for?
- Is the globe really warming?
- Is nuclear energy safe?
- Am I in favor of stem cell research? Gun control? Abortion?

All these decisions require processing an ever-increasing body of information. However, most of us make them based on few, and in some cases, no facts. This needs to change.

MAP science courses are designed to encourage an appreciation for science as a way of knowing. They are based on the belief that information, not rhetoric, should be the most important factor that influences our political and life decisions. They teach students to distinguish between real data and spin, strong inference and anecdote, fact and belief. As students, you will learn how we know what we know, and will be encouraged to challenge even the most entrenched dogmas. You will also be expected to participate in experiments, which are at the core of the scientific process. No matter what career path you choose, the critical thinking skills learned from science will enrich your life.

2. The world of science is intriguing and beautiful.

Science stands next to the arts. At the heart of science is a quest to understand who we humans are, and how we interact with each other and the universe. What is life? Why are we here? What is the origin of the universe? Why do I look like my parents? What makes

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different life forms different? These questions (and thousands of others) have fascinated humans since the beginning of recorded time.

MAP science courses foster a sense of wonder about the natural world. They present topics that are inherently interesting, and provide students with a conceptual understanding of the ingenious technical achievements that have deepened mankind's understanding of physics, chemistry, biology, earth science, and ourselves.

3. Science is a collective human endeavor.

Scientists are individuals whose creativity, passion, and charisma rival those of the most celebrated artists, writers, and political figures. Although often depicted as solitary figures working on tedious projects, each scientist is part of an evolving global network of people who push forward the boundaries of human knowledge.

By learning about scientists, one learns what makes science special. It is not that science is somehow separated from human idiosyncracy or fallibility. Instead, what makes science special is that, *despite* human idiosyncracy and fallibility, the collective human desire to understand our universe endures. Science has a universal and powerful standard for what constitutes knowledge, a standard based on independent observation and reproducibility. This stringent standard gives us confidence in our current understanding of the world, and is a humbling reminder of how much remains unknown.

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