DNA: Friend or Foe is a General Education course. First-year students who first enroll at Temple University in or at any time after the Fall 2008 semester must complete the GenEd curriculum, which consists of 11 courses in 9 different areas. However, core students (who entered Temple before Spring 2009) can use Gen Ed courses to satisfy their Core requirements. DNA: Friend or Foe is classified as a Science B course in the core curriculum. Gen Ed students cannot take Core courses such as Human Biology at Temple to satisfy their Gen Ed requirement.

There are no prerequisites or corequisites for Biology 0848. This course cannot be used for credit toward a major in Biology.

DNA: Friend or Foe is an introduction to the principles of heredity and the genetic material that is responsible for heredity. DNA: Friend or Foe is an inquiry-based course that will link traditional genetics and genetic engineering concepts of modern biology in order to understand how modern biology affects our daily lives, and how it may impact future generations. This course will develop critical thinking, promote intellectual curiosity in the life sciences, and stimulate student-student interactions. By using tools of investigative science, students will examine basic concepts and applications of recombinant DNA technology. Topics will include DNA in modern forensic analysis, basic scientific and sociological aspects of human genetic information including genetic polymorphisms and disease, biological terrorism, embryonic and adult stem cells and therapeutic cloning, in vitro fertilization and pre-implantation genetic analysis, ethics of human and animal cloning, genes and behavior, pharmacogenetics and rational drug design, proteomics, and emerging infectious diseases. Other topics will include human gene therapy, susceptibility genes for neuropsychiatric and neurodegenerative disorders, plant biotechnology including insect-resistant plants, genetically modified foods, and bioremediation and phytoremediation. Finally, bioethical considerations of genetic information will be explored in detail throughout the course.

Lecture for DNA: Friend or Foe. Monday and Wednesday 1:00 PM – 1:50 PM. Labs for DNA: Friend or Foe meet on Fridays. All labs will meet in Room 151 of the Biology Life Sciences Bldg. (SW quadrant), 12th & Norris Streets. Entrance is on 12th Street or from Bell Tower side with a Temple ID card.

Instructor: Gregory Smutzer, Ph.D. Office: Biology Life Sciences Building, Room 442, Lab is Room 442 Biology Life Sciences Building, Temple Main campus. Phone: (215) 204-1236. E-mail: smutzerg@temple.edu Ms. Evelyn Vleck is the co-instructor/lab coordinator for this course. Her e-mail address is evleck@temple.edu. Mrs. Vleck’s office is in Room 248P (across from the Biology Main office).

Book:


Grading: This course has both a lecture and a laboratory component. The lab will make up 25% of the course grade. Labs will meet once a week for one hour and 50 minutes. Questions concerning the lab should be directed to Ms. Vleck or your teaching assistant. Labs are held every week during the semester. Mandatory safety training will be held during your first lab. Please remember that attendance for lab is mandatory. Also note that all labs meet on Fridays. If you miss the morning lab and wish to make up the lab that afternoon or evening, please contact Ms. Evelyn Vleck.

The lecture component will comprise 75% of your final grade. For the lecture component, there will one midterm exam during the session and a final exam. Both exams will have equal weight, and each exam will make up 35% of your final grade. The two exams will comprise 70% of your final grade. Exams will be multiple-choice, true-false and discussion questions. The final exam will NOT be comprehensive.

The remaining 5% of your lecture grade will be from class attendance, in-class assignments, and announced quizzes. Some quizzes will be taken in class, and some quizzes may be electronic quizzes. Directions for taking any electronic
quizzes will be posted on Blackboard. All quizzes will have equal weight. Finally, remember that a grade of **C minus or better** is required to receive credit for this course.

- **Mid-term exam**: 35%  The first exam is comprehensive.
- **Final Exam**: 35 %  (not comprehensive)
- **Announced quizzes**: 5 %  (quizzes, attendance, and in-class activities).
- **Lab grade**: 25 %  (Attendance at labs is mandatory)

**Grading Scale for Final Grade.** Incomplete grades (I grades) are not normally given in this course. If you cannot complete the course, you will need a note from your Temple U. academic advisor.

**For test grade, take your score, and divide by the total number of points x 100.**

<table>
<thead>
<tr>
<th>Grade Range</th>
<th>Letter Grade</th>
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<tbody>
<tr>
<td>88% - 100%</td>
<td>A</td>
</tr>
<tr>
<td>78%– 87.9%</td>
<td>B</td>
</tr>
<tr>
<td>55% - 77.9%</td>
<td>C</td>
</tr>
<tr>
<td>50% - 54.9%</td>
<td>D</td>
</tr>
<tr>
<td>&lt;50%</td>
<td>F</td>
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</tbody>
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**Extra credit.** Extra credit is not offered to individual students.

**Fire Alarm during exam.** In case of a fire alarm, place your exam face down on your desk, and immediately exit the room.

**Lecture Attendance.** Attendance at the lecture is very strongly recommended. Attendance will be taken at the end of lecture (after week one) by use of a sign-in sheet at the front wall or desk. Sign in sheets will be organized according to your lab section. Please use the last four digits of your TUID when signing in.

**Makeup exams:** If the hourly exam is missed due to a medical or legal reason, you MUST take the exam during the two hour final exam time – immediately after you have completed the lecture exam. *(Friday, December 13, 2013 between 10:30AM and 12:45 PM)*. **There will be no exceptions.** In order to take a makeup exam, written documentation will be required. Written documentation includes medical, dental, and legal excuses from your physician, dentist, or lawyer. Notes from PAs, chiropractors, auto repair technicians, hair stylists, being a contestant on American Idol, or podiatrists are generally not accepted. I will need a copy of the documentation for my files. **PLEASE BRING YOUR MEDICAL OR LEGAL EXCUSE WITH YOU, AND TURN IN YOUR EXCUSE JUST AFTER YOU FINISH YOUR FINAL EXAM ON Friday, DECEMBER 13th.** If a medical, dental, or legal excuse is not presented by the student, then a missed exam will result in a grade of zero percent.

**Withdrawals:** Monday, September 9th, is the last day to withdraw from a course (without a W grade). Tuesday, October 22nd is the last day to withdraw from an undergraduate course (with a W grade).

**Makeup Quizzes:** If a valid excuse is presented for missing an in-class quiz, one quiz can be made up at the end of the semester. Makeup quizzes will be on **Wednesday, December 11th** between 12:30 PM and 1:00 PM in Room 151 BLS (Lab).

**Final Exam:** The last day of classes is Wednesday December 4th. Thursday, Dec. 5th and Friday, Dec 6th are study days. For lecture, the final exam will **Friday, December 13, 2013 from 10:30 AM to 12:30 PM in Room 162 Beury Hall.** The final exam for lecture will **not** be comprehensive. The final exam will cover the second half of the course, along with reading assignments. Due to the relatively large size of the class, we cannot administer the exam earlier (or later) than the scheduled date for anyone who is registered for the course.

**Office hours:** I will be in Room 442 BLS on Mondays and Wednesdays from 1 to 2 PM during the fall semester. Please e-mail me if you wish to come by at another time. I am usually here until 6:00 PM on weekdays.

**Cell Phones:** Beury 162 is a Quiet Room. The first room in every building is a quiet room between the hours of 4 AM and 7 PM. Please have consideration for your fellow students. Please turn off all cell phones and pagers before the start of each class. Also, please start up any laptop computers before class starts. In addition, try not to leave and re-enter the classroom during lecture. The “**Cell Phone Curve**” will be in effect from Wednesday, August 28, 2013 through Wednesday, December 3rd, 2013 during lecture.

**Blackboard and Problem Sets:** Depending on the subject matter, some multiple-choice questions with answers will be posted onto the Temple Blackboard site (http://tuportal.temple.edu) to help you study.
To reach Blackboard, you must use the link mentioned above. You MUST have a temple.edu e-mail address to access Blackboard. Your USER NAME in your e-mail address is your logon name. Please note that these problem sets are supplemental, and are to help you learn. If you have specific questions, we won't go over the multiple-choice questions in class. If you are unsure of any answers, please ask in class or during office hours. You can also post any questions on the DISCUSSION BOARD in the communication section (button to left of screen) of Blackboard. Please type in the entire question so that I can check your answer. You can post questions anonymously. Exam questions will likely include questions from the multiple-choice questions.

**Academic Assistance.** The math-science center is located on the second floor of 1800 Liacouras Walk, extension 1-8466. This center provides instruction for the basic sciences, and preparation for exams. In addition, your teaching assistant can help with lecture or lab questions.

**Temple e-mail account.** You can obtain an e-mail account online. Go to: http://www.temple.edu/cs/, and press "activate account." You can instantly obtain a Temple e-mail account.

**Accommodation.** Any student who has a need for accommodation based on the impact of a disability should contact Disability Resources and Services at 100 Ritter Annex (003-00), 1301 Cecil B. Moore Ave., Philadelphia, PA 19122. The phone number is 215-204-1280. Please fill out the BLUE FORM for accommodation, have me sign it, and hand it in to the Disability Office at least 24 hours before the scheduled exam. Accommodations for exams and quizzes will be made for students with documented disabilities.

**Academic Integrity**

All relevant Temple University policies regarding Academic Integrity must be followed. These policies include no cheating, no plagiarism and reporting any knowledge thereof. Plagiarism is the act of presenting the intellectual work of others as if it were one's own. Please consult the Student Handbook, or the appropriate web-page (http://oll.temple.edu/ih/writing/plagiarism2.htm) for further information.

**Student Learning Outcomes.** The student will demonstrate knowledge of fundamental information concerning DNA structure and function, proteins, genetics, biotechnology, bioterrorism, and bioethics. **Assessment:** Basic knowledge of these facts, processes, and concepts will be quantitatively assessed through the use of lecture quizzes, lecture exams, lab reports, class presentations, and lab quizzes.

**Final Grades.** If you feel that your final grade is incorrect, we will recheck all of your grades to identify any potential errors. Please make sure that you fill in your name correctly on the blue Scantron sheets to minimize any errors. As a safeguard, you should routinely examine your posted exam, quiz, and lab grades on the course Blackboard grade site during the semester. If you are not satisfied with your final grade for the course, please contact the Biology Department ombudsperson, Room 159 B BLS.

**DNA: Friend or Foe – Fall 2013.**

**Module One. General background**
- Introduction to the Scientific Method
- Bioethics and Informed Consent
- Tuskegee, Willowbrook, Project MKULTRA LSD studies
- Edgewood, Md. Arsenal studies
- Holmsburg prison studies and Retin A
- Brief introduction to Proteins
- Primary, secondary, tertiary, quaternary structure
- Protein function


**Module Two. Biological warfare**
- History of Biological Warfare
- Micro-organisms and Proteins - their use in Biological Warfare
- Anthrax, Ricin, Tularemia, botulism.
- Modified proteins and their use in nerve gas defense

Quiz 1 after completion of Module Two.
Module Three. DNA structure and Mendelian genetics

**http://biology.kenyon.edu/courses/biol63/watson_06.pdf**

- Nucleic acids - Structure of DNA and RNA
- DNA methylation
- Packaging of DNA in chromosomes, Chromosome structure
- Telomeres and Cellular Aging
- The cell cycle and mitosis.
- Brief overview of meiosis.
- Brief overview of Mendelian and Non-Mendelian Genetics
- Human Genetics
  - autosomal recessive, autosomal dominant,
  - X-linked genes,
  - sex-influenced genes, CAIS.

Module Four – DNA and Medicine

*In vitro* fertilization
- Prenatal Diagnosis and Pre-implantation genetics
- The Genetics of Sex Determination
- Arguments for and against Sex Selection, family balancing

**Midterm Exam. Monday, October 14, 2013 in Beury 162.**

Module Five. Molecular Genetics and Genetic Engineering

- An Introduction to Genes and Genomes
- HUGO, genes and behavior,
- Mitochondrial genome
- Genetic Code, Gene Transcription and gene regulation
- DNA methylation
- Protein Translation
- Recombinant DNA Technology
  - Plasmids
  - DNA ligases, Reverse Transcriptases, Restriction Enzymes,
  - DNA and RNA polymerases
  - PCR, real time PCR
  - Automated DNA sequencing
  - Genomic and cDNA libraries

Module Six. Applied Molecular Biology & Applications of Recombinant DNA technol.

- Proteins as Gene Products, Proteomics
- Microbial Biotechnology
- Plant Biotechnology, gene transfer in plants
- Genetically modified foods – Starlink corn, Bt plants.
- Animal Biotechnology, somatic nuclear transfer, animal cloning
- Cloning of extinct species
- Therapeutic cloning
- Should humans be cloned?
- Bioremediation using bacteria and plants

Module Seven. DNA Fingerprinting

- VNTRs, RFLP, DNA fingerprinting
- mtDNA fingerprinting
- Detection of SNPs – taste blindness, asparagus odor
- Y chromosome analysis
- CODIS, Forensic DNA Analysis
Supreme Court decision and DNA collection

**Quiz 2 after completion of Module Seven.**

Module Eight. Medical Biotechnology
- Medical Biotechnology
- Embryonic Stem Cells and Stem cell therapy
- Adult stem cells
- Ethics of Stem Cell Therapy
- Human gene therapy
- Human vaccine production
- Pharmacogenomics and Rational drug design – SSRI, Herceptin, etc.
- Pharmacogenetics and SNPs.
- Personalized medicine
- Human neurological disorders & genetics – Alz. Disease, Parkinson’s Disease, Huntington’s Disease
- Genetic Testing
- Human DNA tests, Genetic Testing (PSA, BRCA1, AD, HIV, etc).
- GINA and Genetic discrimination

Module Nine. Selected topics
- HeLa cells – recent genome sequencing, bioethical concerns
- Gene Patents, patenting cell lines
- Patenting living organisms
- Confidentiality Agreements

**Final Exam:** Friday, December 13, 2013 from 10:30 AM to 12:30 PM in Room 162 Beury Hall.

**Remember:** Don’t miss lab without a valid excuse. Missing two or more labs without a valid excuse will LOWER YOUR FINAL GRADE BY ONE LETTER GRADE.

**Remember:** If you missed the mid-term lecture exam with a valid excuse, you will need to make it up immediately following the final exam, and during the time scheduled for the final exam. Makeup exams will be multiple-choice, short answer, and completion questions.

**Remember:** You NEED TO bring your Temple ID and a number two pencil for lecture exams. A pencil sharpener will be available for you to use.

**Remember:** Remember: Makeup quizzes will be on Wednesday, December 11th between 12:30 PM and 1:00 PM in Room 151 BLS (Lab). Only one quiz can be made up during the Fall 2013 semester.