

**Anaerobic Microbiology (Micr 414)**

**Fall 2002**

**Lecture: Tues. & Thurs. 10:00-10:50 a.m. In Grove Hall 108**

**Lab: Thurs. 1:00-3:50 p.m. DM 203**

**Instructor:** Dr. Susan Gibson  
BioStress Building, Room 252C (office)  
BioStress Building, Room 239 (lab)  
Office Phone: 688-4805  
e-mail: susan\_gibson@sdstate.edu

Office hours:

Mon. & Wed. 9:00-11:00, Tues. and Thurs. 8:30-9:30 or by  
appointment.

I can be available other times by appointment or drop-in. (During office hours, I will usually be in BioStress 252C or in BioStress 239. Occasionally, I will be working in Dairy/Micro 203 or media prep room. A sign will on my office door informing you of where I am during scheduled office hours.)

**Course Goals:**

Gain familiarity with several methods for culturing anaerobic organisms  
Basic knowledge of many groups of anaerobic organisms  
(including metabolism, ecology, etc.)  
Appreciation for the interrelationships and complexity of anaerobic  
communities  
Practice oral and written communication skills  
Record keeping in laboratory

**Required Supplies:** Bound notebook (spiral bound OK)  
Calculator  
e-mail address (if you don't have one, you can obtain one at  
<http://www.hotmail.com> or other source  
Permanent marker

**Optional:** Safety goggles (available in bookstore)

**Textbook:** Fenchel, T. And B.J. Finlay. 1995. Ecology and Evolution in Anoxic Worlds. Oxford University Press.

**Other references:** A.J.B. Zehnder (ed). 1988. Biology of Anaerobic Microorganisms  
John Wiley & Sons, Inc.

Paul N. Levett. 1990. Anaerobic Bacteria. Open University Press.

K.T. Holland, J.S. Knapp and J.G. Shoesmith. 1987. Anaerobic

Bacteria. Chapman and Hall, New York.

Gerhard Gottschalk. 1986. Bacterial Metabolism 2nd ed.  
Springer-Verlag, New York.

**Grading:**

Lecture:

3 exams, 100 points each	300 pts.
comprehensive final	100 pts.
Final exam noon-1:40 p.m. Wed. Dec. 18	
Short write-ups/problem sets	70 pts.

Laboratory:

Lab exercise 1 -results	5 pts.
Isolation of strict anaerobe	
Design of isolation protocol	25 pts.
Oral report on isolation	25 pts.
Written report on isolation	50 pts.
Notebooks*	25 pts.
Participation	25 pts.
Journal presentation (Using PowerPoint)	25 pts.
Team metabolism exercise	50 pts.

Total Lecture and Lab Points                      700 pts.

\*Notebooks may be spot-checked during the semester to be sure they are up-to-date.  
This will be part of the 25 points.

**Lab Report Format:**

The lab report should be turned in at the beginning of the lab period on the date indicated on the syllabus. Grades for reports turned in late will be reduced 10% per school day. Lab reports should be concise, complete, and typed. Please write in complete sentences and use proper grammar. Reports should follow the format below:

1. Title, Date, Name
2. Abstract: Very short summary of what you did, why you did it, what your results and conclusions were (Use articles from Applied and Environmental Microbiology as a guide).
3. Introduction: Give some background on the organism type you are trying to isolate, etc.
4. Materials & Methods. Describe briefly what you did. Specify all factors which affect microbial growth (and thus outcome). Temperature of incubation, medium used, length of incubation, source of inoculum, amount of inoculum etc.
5. Results: Describe results using tables, figures, graphs, etc. as appropriate.

6. Discussion: Briefly discuss your results but don't restate them. What can you conclude from the results? Can you prove that you have the type of organism you were trying to isolate? List other experiments which might be used to further prove that you have what you think you have.

These should be written up according to the instructions for authors in the Journal of Applied and Environmental Microbiology. Instructions to authors will be found in the Jan. issue of each volume. It will also make it easier if you look at several journal articles to see how they are "put together".

### **Academic Honesty**

Plagiarism and cheating are not acceptable. See Student Handbook for details. Also see department policy following.

### **Late Assignments**

Points will be deducted for work turned in late (after 5 p.m. of the day it's due). 10% of the possible points will be deducted from an assignment for each day it is late.

### **Final grades:**

A's	≥	671.25pts.	≥89.5% of total possible
B's		596.25-671.2	79.5-89.4% of possible
C's		521.25-596.2	69.5-79.4% of possible
D's		446.25-521.2	59.5-69.4% of possible
F's		≤ 446.2	< 59.5% of possible

### **Disabilities:**

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please inform me and make the appropriate arrangements with the Office of Disability Services (ODS). The Office of Disability Services is located in 110 West Hall. To schedule an appointment call (605) 688-4504 and request to speak with Nancy L. Schade the Coordinator of Disability Services.

## Lab Safety

No food, drinks, or tobacco use in the lab.

No mouth pipetting.

Safety glasses required.

Do not wear open toed shoes.

Clean up spills as soon as they occur.

Wash lab bench with a disinfectant before and after each lab.

If a cut or puncture wound occurs, report it to the instructor. You should also consider a tetanus booster in the event of a deep cut or puncture wound if you haven't had one recently.

Make sure to place needles/syringes in a designated container (point down) after use. Do not throw needles into the trash. Biologically contaminated needles and syringes must be placed in designated areas for autoclaving before either cleaning for reuse or disposal. Needles must be clipped (metal part staying inside plastic container) and syringes destroyed by cutting off tip before disposal.

Broken glass (uncontaminated) must be placed in the designated container. If a culture container (or otherwise contaminated glassware) is broken, it must be placed in a container to be autoclaved before the glass is discarded in the broken glass container.

Properly dispose of cultures and contaminated materials.

Never unstrap a gas cylinder without removing regulator and replacing cylinder cap first. Gas cylinders without caps must be secured to a bench or wall at all times.

Before removing a regulator, be sure cylinder is turned off at the main valve. Bleed any pressure before removing regulator.

Wash hands thoroughly after class.

## Notebooks

Bound - spiral OK

1st couple pages leave blank for Table of Contents

Fill in Experiments in Table of Contents as you go

Keep notebook in diary format - new page started on each date

Date each entry at the top of the page

If the entry for a given date takes more than one page, put the date (cont.) on all following pages

Make a diagonal mark through any unused portions of the page

Sign and date at the bottom of the day's entry

Use ink only - if you make a mistake, cross it out with a single line - you should still be able to read what was written. Write an explanation of why the material entered was incorrect

Date each entry in an obvious place

Write a purpose before starting a new experiment/isolation attempt

Write down everything you do - common procedures in a published source

can be referred to and not written out but a general outline of steps should be included and with references back to the source as needed

Any changes made to the written protocol must be noted. Any problems which occur during the experiment should also be noted.

Record raw data, include any tapes, charts, etc. from data collection

Show calculations

Graph data if appropriate

Final results

Conclusions - Did the results support your hypothesis or not?

- Explanations of any problems - ideas for further experiments which should be done to further elucidate the mechanisms occurring

## **Micro 414 - tentative lecture schedule**

### Introduction

- Characteristics of oxygen
- Classification based on use of oxygen
  - Catalase
  - Superoxide dismutase
- Aerotolerant
- Oxygen toxicity vs inability to gain energy from limited metabolic pathways under high redox conditions
- Culture - remove oxygen
  - use reductants to lower redox potential
  - protect from reintroduction of oxygen
  - Effects of coculture with facultative organisms

Review - molarity, dilutions

Review aerobic metabolism

### **Chapter 1**

### **Chapter 2**

- Thermodynamics
- Fermentation
- Anaerobic Respiration
- Anaerobic Photosynthesis
- Basic community structure/anaerobic environments
- Interspecies hydrogen transfer

### **Chapter 3**

- Anaerobic eucaryotes
- Endosymbionts

### **Chapter 4**

- Structure of anaerobic communities

### **Chapter 5**

- Interactions with the oxic world

**Tentative Exam Dates (exams will probably be during lab time to avoid time constraints)**

- Thurs. Oct 3
- Thurs. Nov. 7
- Thurs. Dec. 5

### Lab Micro 414 (tentative lab schedule)

Sept. 5	Safety Notebook Review molarity, dilutions
Sept. 12	Introduction to glovebox Handling pressurized serum bottles Inoculate media for first exercise and take initial optical density readings.
Sept. 19	Take O.D. readings on tubes for exercise 1; pool class data Categorize each organisms as obligate aerobe, obligate anaerobe (strict or aerotolerant), or facultative. Write up a short report on this exercise including your reasoning for classifying each organism as you did. This write-up is worth 5 points and is due on Thurs. Sept. 26. Start Winogradsky columns
Sept. 26	Making media (degassing in glovebox) Discussion of media components, reductants, vitamins, rich media vs. basal salts Enrichment lecture Choose organism type for isolation. Choose from list provided.
Oct. 3	Inoculate solid media with <u>Clostridium</u> Develop enrichment/isolation protocol including media needed
Oct. 10	Make media for enrichments Exercise in anaerobic picking of colonies.
Oct. 17	Inoculate enrichments Observe media with picked colonies Repeat picking of anaerobic colonies if needed
Oct. 24	Continue isolations.
Oct. 31	Continue isolation
Nov. 7	Continue isolations
Nov. 14	Continue isolations
Nov. 21	Continue isolations
Nov. 28	Finish isolations

Dec. 5	Oral presentation on results on isolations.
Dec. 12	Notebooks due Lab report on isolation due
Dec. 18	Final exam 12:00-1:40 p.m. Wed. Dec. 18

### **BIOLOGY/MICROBIOLOGY DEPARTMENT ACADEMIC DISHONESTY POLICY**

It is unethical and unprofessional to present the work done by others in a manner that indicates that the student is presenting the material as his/her original ideas or work. The penalty for academic dishonesty may be one or more of the following, at the discretion of the instructor, and based on the seriousness of the situation.

Cheating, assisting others, or plagiarizing on tests, problems, research papers, or other assignments will result in written notification to the student involved, the academic advisor, the Biology-Microbiology Department, the appropriate College or Administrative Dean, and parent/guardian (when the student is dependent for financial aid purposes); and one or more of the following:

1. a grade of zero on the test, quiz, homework, problem, or other assignment for the student(s) involved.
2. a grade of F for the course.
3. referral of the matter to the Student Conduct Committee for disciplinary action. (The minimum sanction is disciplinary probation).

Students have the right to appeal an academic dishonesty charge as outlined in the procedures below. No final course grades will be given until all avenues of appeal have been completed or the case resolved.

If repeated offenses occur in either a specific Biology/Microbiology class or in 2 or more different Biology/Microbiology classes, the matter will be automatically referred to the Student Conduct Committee.

## **APPEAL AND NOTIFICATION PROCEDURES**

### **Notification**

1. When a student is determined to have broken the BM Department Academic Dishonesty Policy, that student will be notified in writing by the faculty member involved as to the problem and sanction that was selected. A copy of the written notification will be sent to the Department (Teaching Coordinator) so a record to protect the student and the faculty member is established.
2. No written notification to others listed in this policy will occur until all avenues of appeals have been exhausted or the case resolved.

### **Appeals**

1. The student has the right to appeal the faculty member's decision. The informal appeal should be made directly (both orally and in writing) to the faculty member involved within 5 class days of notification or within 7 calendar days of notification, if incident is at the end of the semester. A copy of the written request will be sent to the Department (Teaching Coordinator) so the record to protect the student and the faculty member is complete. A written summary of the appeal will be sent to the Department (Teaching Coordinator) by the student and the faculty member involved.
2. The student can appeal to the Department Head if the appeal to the faculty member is not resolved. This informal appeal should be made both orally and in writing within 5 class days after the appeal with the faculty member or within 7 calendar days after the appeal with the faculty member, if first appeal is held at the end of the semester. The Department Head will reach a decision and provide written notification of that decision to Departmental (Teaching Coordinator) files and to the individuals involved.
3. If the faculty member chooses to use the Student Conduct System as a sanction for the academic dishonesty incident, then the event will be sent directly to the Student Conduct System for a decision after the Department Head's review.
4. If the faculty member chooses a grade of zero on an assignment or a course grade of F, the student can appeal through the established SDSU Academic Dishonesty and Grade Appeal Process (Contact Student Affairs or Vice-President for Academic Affairs Office to obtain the proper procedures).
5. After all official appeal processes and/or conduct hearings have occurred and the student is still found to be in violation of the Bio/Micro Department Academic Dishonesty Policy written notification will be sent by the Department (Teaching Coordinator), to the academic advisor, the College or Administrative Dean and parent/guardian (if appropriate). The sanction identified by the instructor at the time of incident will also be enacted.