

INSTRUCTOR: Dr. Robert D. Slocum
LABORATORY: TH 1:30 – 4:30 PM, HS G30
OFFICE HOURS: By appointment, HS G46
PHONE: x 6303

Course Grading

A total of 7 different structured lab exercises will be completed during the semester. Written lab reports will be turned in one week after the completion of each exercise. *Lab reports will be assessed a penalty of a letter grade for each day that they are passed in beyond the deadline, unless an extension is granted by the instructor.*

Each lab report is worth 20 points. A report for each lab must be turned in, but the lowest grade will be dropped at the end of the semester.

During the second half of the semester, students will carry out independently-designed experiments in which they will experimentally investigate biochemical, physiological, environmental factors which influence the activity of glutamine synthetase, a key enzyme in nitrogen assimilation in all living organisms.

The first week of the independent research project is devoted to planning the experiment. The topic is researched and a formal (brief) proposal is submitted to the instructor by the second week. Required materials are ordered; reagents, media, etc. are made and required plants are planted or placed into sterile culture. After the work is completed, student teams present their research findings in a final written report, due the last week of lab.

The independent research project is worth 100 points, or 50% of the lab grade.

Six lab reports (20 pts. each)	120 points
Independent lab project / report	<u>80 points</u>
Total	200 pts.

ACADEMIC HONOR CODE:

Students are bound by the standards of the Academic Honor Code, found at <http://www.goucher.edu/documents/General/AcademicHonorCode.pdf>

Lab Reports

In the laboratory, students will generally work in pairs. Some lab exercises will be carried out over the course of several weeks and students often find it desirable to divide up the lab duties. However, each individual will be responsible for collecting all experimental data, for understanding the general concepts and techniques employed throughout the entire experiment, and **for writing the final report.**

Many lab reports are handed in directly, along with answers to questions. Some lab reports (e.g., the mineral nutrition lab) are written. These must be typed (handwritten reports will not be accepted) and should be organized as follows:

Introduction: A brief description of the experiment and the problems or questions it addresses. A clear statement of the objectives and relationship of the study to previous investigations.

Methods: Normally, one gives a detailed description of reagents, equipment and methodology used to carry out the experiment. It is important that this information be accurate and complete so that an investigator may attempt to validate the results of the study by repeating the experiment. Since the student will be provided with this information on the lab handouts, include only information that describes any *variations* on the methods that were used.

Results and Discussion: Experimental data are summarized and interpreted by the investigator. Technical problems, limitations, etc. are discussed in relation to actual versus expected observations. The significance of your observations are related to the findings of other investigators.

Tables and Figures: Supporting data should be presented in clearly-organized and numbered tables and figures, along with appropriate headings or legends, at the end of the report. A general standard for published tables and figures is that each should be able to "stand alone" and be understandable to the reader. In other words, one shouldn't have to spend lots of time digging through the text in order to understand data presented in a table or figure.

Most students use Excel for and data analyses presentation in tables, but the graphics capabilities of this application are limited. Kaleidograph, Prism, or other graphing/statistics packages may also be used.

A digital camera and photomicroscope will be available for photographic recording of experiments. Downloaded JPEG images can be incorporated directly into Word documents or PowerPoint presentations.

In other words, the experiment write-up follows a standard format for scientific reports submitted for publication.

Laboratory Schedule

<u>Date</u>	<u>Laboratory Exercise</u>
Jan 25	Plant bean seeds for Feb. 11 and Feb. 18 experiments (instructor)
Feb 4	<p>Plant Tissue Culture</p> <ul style="list-style-type: none"> • Carrot callus culture initiation; sterilization and plating of Arabidopsis seed <p>Effects Of Hormones On <i>Brassica</i> Growth and Development</p> <ul style="list-style-type: none"> • Plant sunflower, bean seeds in washed sand for Feb 18 Mineral Nutrition lab (students) • 3 days prior to start of next lab, water some bean plants with 0.2 M NaCl (instructor)
Feb 11	<p>Water Potential and Osmoregulation in Plants</p> <ul style="list-style-type: none"> • Determination of water potential in potato tuber tissues • Osmoregulation via proline production in salt-stressed bean seedlings (Part 1) <p>Tissue Culture - Week 2 <i>Brassica</i> Growth and Development - Week 2</p>
Feb 18	<p>Mineral Nutrition: Effects Of Mineral Deficiencies On Plant Growth And Development</p> <p>Tissue Culture - Week 3 <i>Brassica</i> Growth and Development - Week 3</p> <ul style="list-style-type: none"> • Finish Salt Stress experiment (Part 2, proline assay) • Plant sunflower seeds in dark (etiolated) for next week - pigment analyses (instructor)

Lab schedule (cont.)

- Feb 25** **Photosynthesis 1: Extraction, Quantitation And Spectrophotometric Characterization Of Chlorophylls From Spinach**
- Mineral Nutrition - Week 2
Tissue Culture - Week 4
Brassica Growth and Development - Week 4
- Mar 4** **Photosynthesis 2: Measurement Of Photosynthetic Electron Transport In Isolated Chloroplasts - The Hill Reaction**
- Mineral Nutrition - Week 3
Tissue Culture - Week 5
Brassica Growth and Development - Week 5
- Mar 11** **Spectrophotometric Assay Of Glutamine Synthetase Activity**
- Tissue Culture - Week 6
- Brassica* Growth and Development – end; collect final data
Mineral Nutrition – end; collect final data
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- Mar 18** **No lab - SPRING BREAK**
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- Mar 25** **The Role of Polar Auxin Transport in Arabidopsis Root Growth and Gravitropic Bending**
- Tissue Culture - Week 8
- Apr. 1** **Independent Research. Regulation of Glutamine Synthetase Activity in Plant Tissues**
- Planning the experiment; research proposal due next week
- Tissue Culture - Week 9

Lab schedule (cont.)

- April 8** **Independent Research - Week 2**
Tissue Culture - Week 10
- April 15** **Independent Research - Week 3**
Tissue Culture - Week 11 (End)
- April 22** **Independent Research - Week 4**
- April 29** **Independent Research – Week 5**
- May 6** **Independent Research – Research paper due**