

BURLINGTON COUNTY COLLEGE

EET 101

INTRODUCTION to ELECTRONICS

SYLLABUS

FALL 2009

COURSE SYLLABUS SUMMARY for EET 101 Introduction to Electronics

LEC INSTRUCTOR: _____ OFFICE: _____ PHONE: (856)-222-9311 ext. _____

LAB INSTRUCTOR: _____ OFFICE: _____ PHONE: (856)-222-9311 ext. _____

COURSE DESCRIPTION:

This course explores the fields of electronics and computers for those who have no experience in these fields.

It includes circuit components, Ohm's Law, basic DC and AC circuits, and an introduction to power supplies, transistor and integrated circuit amplifiers and opto-electronic communications.

Laboratory experiments cover these topics and verify lecture theory. The laboratory also introduces measurement techniques using a multimeter, function generator, oscilloscope and computer simulation using circuit analysis software.

REQUIRED TEXT and 3 Ring Binders:

Text: **Essentials of Electronics**, by Frank D. Petruzella, 2nd Edition,
ISBN 0-07821048-8; Glencoe/McGraw Hill, 2001.

Two ½ " 3 Ring Binders to hold the Lectures, HW, Labs and Test Equip. Instr. Guide.

EVALUATION:

- A. Two (2) excused absences are permitted per term. Students are expected to be on time and stay for the full duration of the class, otherwise they may be marked absent. If a student's absences are excessive, the instructor may assign the student an "F" grade for the course.
- B. Academic misconduct that disrupts the learning process in class such as leaving the classroom for cell phone conversations can affect the final grade.
- C. Calculation of the Final Grade Point Average

| | |
|--------------------|-----|
| Test Grade Average | 50% |
| HW Grade Average | 20% |
| Lab Grade Average | 30% |

FINAL GRADE BREAKDOWN

| | | | |
|----|-----------|---|----------|
| A | 90 to 100 | C | 70 to 74 |
| B+ | 85 to 89 | D | 65 to 69 |
| B | 80 to 84 | F | below 65 |
| C+ | 75 to 79 | | |

COURSE SYLLABUS

COURSE # / Title: EET-101 / INTRODUCTION to ELECTRONICS

SEMESTER CREDIT HOURS: 3

**PREREQUISITES/COREQUISITES: MTH-075 or High School Algebra Proficiency
EET101 cannot be taken after passing EET121**

COURSE MEETINGS: 2 Days per Week for 2 Hours Each.

Day: 1st day: ¾ hours is for HW, Question/Answer session
1 ¼ hrs is for Lecture
2nd day: 2 hours is for Lab

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This course explores the fields of electronics and computers for those who have no experience in these fields. It includes circuit components, Ohm's Law, basic DC and AC circuits, and an introduction to power supplies, transistor and integrated circuit amplifiers and opto-electronic communications. Laboratory experiments cover these topics and verify lecture theory.

The laboratory also introduces measurement techniques using a multimeter, function generator, oscilloscope and computer simulation using circuit analysis software.

RATIONALE:

Introduction to Electronics is required in the technical preparation part of the A.A.S. Degree in Electronics Engineering Technology as a prerequisite for Circuits I (ET121) if a student does not have previous circuit background. This course is part of the Electronic Engineering Technology program and Computer Servicing and Networking Technology option. This A.A.S. Degree Program and Option prepare residents of Burlington County to qualify for job opportunities as an electronic technician.

This course can also be used as an elective in other technology programs to give students a well-rounded background of the basics of electrical laws and a survey of the various areas of electronics with practical hands on labs.

This course can also be used by someone considering exploring the field of Electronics and wants to gain an insight of what Electronics is about and how this knowledge can be applied to the real world. Through labs with practical applications, the course provides a survey of the various areas of electronics and an introduction to the courses offered in the program.

The A.A.S. degree for the Electronic Engineering Technology program is transferable to Drexel's, BS degree in Applied Engineering Technology, and Temple's, or NJIT's or FDU's BS Degree in Engineering Technology.

The A.A.S. degree for the Computer Servicing & Networking Technology option is transferable to Drexel's BS AET degree (Mechanical concentration); or NJIT's BS Degree in Engineering Technology with the Computer Option.

ABET Accreditation of Burlington County College's Electronics Engineering Technology Program and Computer Servicing & Networking Technology Option

What is accreditation? Accreditation is used to assure quality of programs in educational institutions. It requires our college and EET program meet certain, defined standards or criteria. There are two types of accreditation, institutional and specialized. Institutional accreditors, such as the Middle States Association of Colleges and Schools, are “regional” accreditors and examine the college as a whole. Specialized accreditors evaluate specific programs such as the engineering and technology programs. The Accreditation Board for Engineering and Technology (ABET) is a professional accrediting organization that accredits Electronics Engineering Technology and Engineering programs across the country.

How does accreditation benefit the student? Accreditation serves to notify parents and prospective students that a program has met accepted standards. Student work, faculty qualifications, laboratory resources and administrative support are evaluated for strengths and weaknesses and a report is issued on ways to improve the program. Employers know that these graduates are prepared to begin professional practice. Students who graduate from an ABET accredited institution have an easier time transferring to other ABET accredited institutions. Also, state licensing boards and certification programs may require graduation from an ABET-accredited program as the first step in the registration or certification process for professional practice. In some instances, ABET accreditation may permit students to receive federal funds in the form of scholarships, loans and grants.

Accreditation Board for Engineering and Technology (ABET)
111 Market Place, Suite 1050; Baltimore, Maryland 21202
(410)-347-7700; (410)-625-2238 (Fax)

The Electronics Engineering Technology Program and Computer Servicing & Networking Technology Option

Program and Option Mission Statement

The mission of the Burlington County College Electronics Engineering Technology Program and Computer Servicing & Networking Technology Option is to produce graduates who are able to obtain employment as a technician or transfer to a four-year college. In addition, our graduates will be technically competent, able to communicate effectively, work well with others and demonstrate professionalism.

Program and Option Educational Objectives

The Electronics Engineering Technology Program and Computer Servicing & Networking Technology Option prepare graduates who, during the first few years after graduation, should be able to:

1. Find employment as a technician or transfer to a four-year college,
2. Apply a broad knowledge of electronics and computer engineering technology to support manufacturing, design, testing, troubleshooting, sales, and field service of electronic and computer systems,
3. Apply knowledge of analog and digital electronics and use mathematics, scientific principles, and critical thinking to creatively solve technical problems,
4. Utilize computers and software in a technical environment,
5. Communicate effectively both verbally and in writing,
6. Work effectively as an individual and as a member of a team,
7. Show a recognition of the need for professional, ethical and social responsibilities and
8. Continue professional training through conferences, seminars, courses and the pursuit of advanced degrees.

Program Outcomes

Graduates of the Electronics Engineering Technology Program and Computer Servicing & Networking Technology Option should demonstrate:

- a. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines,
- b. an ability to apply current knowledge to new applications,
- c. an ability to conduct, analyze and interpret experimental results and apply results to make improvements where applicable,
- d. an ability to apply creativity in the design of systems, circuits or processes,
- e. an ability to work effectively on teams,
- f. an ability to identify the characteristics of, analyze and solve technical problems,
- g. an ability to communicate effectively through writing and oral presentation,
- h. a recognition of the need for, and an ability to engage in lifelong learning,
- i. an ability to understand professional, ethical, and social responsibilities,
- j. respect for diversity and a knowledge of contemporary professional, societal, and global issues, and
- k. a commitment to quality, timeliness and continuous improvement.

EET 101 Course Objectives

Students should be able to:

1. use electronic test equipment including the digital oscilloscope, function generator, and multimeter to make measurements.
2. use electronic circuit analysis software to analyze circuits
3. applying the fundamental laws of electricity to analyze and solve problems for simple DC and AC circuits containing passive components.
4. identifying characteristics of ,analyzing, and solving problems for basic electronic circuits containing transistors, IC's and optoelectronic devices

EET 101 INTRODUCTION to ELECTRONICS – COURSE OUTLINE

| Unit & Week # | Topic |
|------------------------------|---|
| 1 | Conduction, Current, and Voltage Lab 1 - Building and using a Continuity Tester |
| 2 | Resistance, Prefixes, Ohm's Law, and Power Lab 2 - Resistance Color Code, Use of DMM to Measure Resistance, and use of Ohm's Law to Determine Resistance. |
| 3 | Series Circuits Lab 3 - Using the VOM to Measure DC Voltages in a Series Circuit Electronic Workbench (EWB) introduction |
| 4 | Parallel Circuits Lab 4 - Using the VOM to measure DC Currents in a Parallel Circuit and EWB analysis of the Parallel Circuit |
| 5 | Introduction to Alternating Current and Voltage Lab 5 - Introduction to the Function Generator and the Oscilloscope |
| 6 | Capacitance Properties and Capacitive Reactance Lab 6A - How Capacitive reactance changes with Frequency Lab 6B - Applying Capacitance Properties to a Circuit that has both a DC and Hi Frequency AC Waveform |
| 7 | Transformers, Diodes, and the Power Supply. Lab 7 - Using the VOM to test the Diode and to Build a Full Wave AC Power Supply for Auto Accessories |
| 8 | The Bipolar Transistor and Transistor Amplifiers Lab 8 - Use the VOM to test the BP Transistor and to Build a 1 Transistor Walkman Speaker Amplifier |
| 9 | Junction and MOSFET Transistors and Amplifiers Lab 9 - Build a MOSFET Parabolic Dish Microphone - Headphone Amplifier |
| 10 | Integrated Circuits, the Non-Inverting Operational Amplifier & IC Power Amps Lab 10 - Build an IC Power Amp with a Microphone Input |
| 11 | The Inverting Operational Amplifier and the Karaoke IC Power Amplifier Lab 11 - Build a Karaoke IC Power Amp with Mike and Walkman Inputs |
| 12 | Optoelectronics and Light wave Communications Lab 12-TX – Voice Communication via a Light Transmitter Lab 12-RX – Voice Communication via a Light Receiver |

Note: The Minimum Pace is 1 UNIT per WEEK.

COURSE MATERIALS:

1. **Required Text:** (Purchase)

Essentials of Electronics, by Frank D. Petruzella, 2nd Ed., ISBN 0-07821048-8; Glencoe/McGraw Hill, 2001.

2. **Required Calculator:** (Purchase)

A **Scientific Calculator** will be **mandatory**

Cell phone calculators are not allowed for tests !

It should have **Rectangular to Polar conversion. (R↔P Buttons)** for future courses. See **Calculator** page for further details.

3. **Lectures:** (Purchase in BCC bookstore for a nominal fee.)

4. **HW packet:** (Purchase in BCC bookstore for a nominal fee.)

The HW Packet will generally include:

Questions and problems usually follows the order of topics in the Reading Assignment.

5. **Laboratories:** (Purchase in BCC bookstore for a nominal fee.)

For each unit there will be a laboratory.

Laboratories will generally include:

1. Objectives
2. List of Supplies
3. Introduction / Set Up
4. Protoboard Layout & Check-Off Sheet where applicable.
5. Data
6. Calculations and / or Questions
7. Conclusion

- 6: **Ancillary Packets (supplied by instructor):** Reading Assignments, Instruction Guides for: Function Generator & Oscilloscope, and Electronic Workbench (EWB) circuit simulation software.

- 7: **Two ½ " Three-Ring Binders:** (In BCC bookstore for a nominal fee.)

Put in **Binder #1**, The lecture, HW and Reading Packets, and bring Binder #1 to the Lecture and Lab.

Put in **Binder #2**, The Labs, Test Equipment and EWB Packets, and bring Binders #1 and #2 to the Laboratory.

ATTENDANCE POLICY

Two absences are permitted during the term.

If a student's absences are excessive, he may be assigned a grade of "F".

General Attendance Policy from Board Policy #206

"Students are **expected to attend all classes**, clinical, laboratory, and studio sessions **for the full duration** of each instructional session."

Students are expected to be on time.

Note: Attendance will be taken during Lecture and Lab.

A student who is **Late or leaves Early will be marked accordingly.**

Poor Attendance will affect your grade. See pages 11, 13, and 15.

Excused absences as outlined in the student handbook generally require appropriate documentation.

Students are responsible to complete all missed course work for any type of absence.

Students should set up a buddy system. Get phone # of at least one classmate to find out what is missed if absent, and to go over HW and study together.

1st Person's Name: _____ **Phone #** _____

2nd Person's Name: _____ **Phone #** _____

Absences will not be counted in those cases where alternates to classroom activities are assigned during instructor attendance at professional conferences or meetings (e.g., NJEA Convention).

PROFESSIONAL BEHAVIOR EXPECTATIONS

Students are expected to have a professional attitude in class as indicated by the following:

1. **Good attendance**
2. **Be on time for class and stay for the full duration.**
3. Prepared for class. ie. HW complete
4. Turn in assignments on time
5. Participate in class discussions but not talk out of turn.
6. Be an active lab group participant.
7. Have good lab work habits by:
 1. Turning off equipment.
 2. Putting parts back, and particularly resistors in their proper partition in the resistor drawer.
 3. Cleaning up lab benches and pushing in chairs when done.
8. Be respectful and courteous to other students and the instructor. Give assistance to other lab groups if they ask for help.

UNACCEPTABLE / DISRUPTIVE BEHAVIOR

Disruptive behavior can include but is not limited to:

1. **Excessive talking in class** when the instructor or another student is talking. There should be only one person talking at a time in class. The Instructor or a student...not both.
2. Based on Jan 18, 07 Division meeting with the Academic Vice President, **ALL CELL PHONES ARE to be TURNED OFF During Class (Not Set to Vibrate)**
If you are expecting an important call, let the instructor know ahead of time and sit by the door.
Excessive trips out of the classroom for cell phone conversations, snacks, bathroom, smoking, etc. during class can result in a failing grade as covered in the board policy on attendance. These matters should be taken care of outside of class time.
3. **Other Inappropriate activities** include **computer email, chat-rooms, online shopping, etc.; cell phone activities, playing games, listening to CD's, MP3s, or iPod's** during Lecture or Lab.

These items represent Prohibited Conduct as outlined in the BCC Student Code of Conduct. Under the **sanctions**, the student could be **expelled from the class and receive an F grade.**

Labs Conclusion Format

The Lab Conclusion is 20% of the Lab Grade.

Use the following format when typing your lab conclusions. Notes relating to the lab conclusion may be handwritten during the lab period for reference when typing the final version. Use proper written English sentence structure & grammar. Discuss all topics on the conclusion page in a relevant and technical fashion. The length of the conclusion should be between $\frac{3}{4}$ and 1 page. After completing the typed conclusion at the end of the Lab session, print it and turn it in to the instructor. Then, wait for instructor's evaluation before leaving the lab.

Document Specs. for Lab Conclusion:

font size: 14 point font **font type:** Arial, Courier

line spacing: 2 (double)

margins: left = 1.0" right = 1.0"
 top = 1.0" bottom = 1.0"

Note:

Use the paragraph above as an example of the proper format.

Lab Conclusion Instructions

- Each **lab group** will submit **one Conclusion with the names of all group members.**
- Names of lab partners must be put at the top of each member's lab,
- No group may leave early until the lab conclusion is typed, handed-in, evaluated by the lab instructor, returned to the lab group, changes made, and copies made for each lab group member.
- Any group that doesn't get to the conclusion by the end of the lab period should hand it in at the next class session (lecture or lab). The marked-up lab conclusions will be handed back at the following class session.
- Each member of a lab group must hand-in their own lab, with lab partners names at the top, and a corrected copy of the lab conclusion attached at the end.
- **One member must also attach the instructor's marked up conclusion at the end.**
- Conclusions may NOT be shared between groups.

Lab Grading

| | <u># of points deducted</u> |
|--|-----------------------------|
| Missed Lab time (late or left early) -1 point for each ½ hour. | 1 – 5 |
| Excessive consultations with lab instructor (or other lab groups). | 1 |
| Your name missing on top of first page of lab | 1 |
| Missing lab partner(s) names on top of first page of lab | 1 |
| Missing marked up evaluated conclusion | 1/2 |
| Sloppy work | up to 2 |
| Calculations missing or incomplete | up to 2 |
| No steps in calculations (answers only) | up to 2 |
| Calculations with missing units | up to 1 |
| Questions not answered or answered incorrectly | up to 2 |
| Graphs/plots not done or labeled improperly | up to 1 |
| No conclusion | 2 |
| Conclusion not typed or wrong format | 1 |
| Conclusion answered with incomplete sentences and/or incorrect grammar | up to 1 |
| Incorrect or irrelevant statements for Questions or Conclusion | up to 2 |

Grading may seem strict at the beginning, so put in your best effort to get a good grade.

HOMEWORK GRADE: Maximum Grade is worth 5 Points and counts 20% of Final Grade

1. Question/Answer Session Grading:

At the beginning of the question/answer session, I will walk around and issue a HW grade based on its state of completion, neatness, and that all steps to problem solutions are shown.

If HW is not consistently done by the HW session the instructor may give an unannounced quiz at the beginning of the period. The pop quizzes, if given, will count 5% of the final grade.

HOMEWORK GRADING:

| <u>HW Grade</u> | <u>for</u> | <u>% Complete</u> |
|-----------------|------------|-------------------|
| 4 ½ to 5 Pts | | 90 to 100 |
| 4 to 4 ½ Pts | | 80 to 90 |
| 3 ½ to 4 Pts | | 70 to 80 |
| 3 to 3 ½ Pts | | 60 to 70 |
| 0 to 3 Pts | | 0 to 60 |

- 1.) HW turned-in 1 week late will be penalized 1 point
- 2.) HW turned-in 2 weeks late will be penalized 2 points
- 3.) HW more than 3 weeks late will be penalized 3 points etc.
- 4) HW with no calculation steps will loose up to 2 points off HW grade.
- 5) Sloppy HW will loose up to 2 points off HW grade.

Enter your Homework Points in the table below:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____

Drop the lowest score.

Total Points = _____

HW Grade Average = Total points ÷ Number of HW assignments x 20.

The HW Grade average will count 20% of the final grade.

TEST REQUIREMENTS: Test Grade Average Counts 50% of the Final Grade

1. **Tests must be taken on time.**
2. All **cell phones must be Off NOT Vibrate** and **put in back pack** during the test. You **cannot use cell phone calculators for the test.**
3. You **cannot leave the class during a test.** If you leave the class during the test, **the test will be collected.**
4. You will be allowed to take **one late test** at end of the term with No Penalty.
5. **For 2 or more late tests 10% will be deducted.**
6. **No low test grades will be dropped.**
7. **One retest** will be given to **replace your lowest grade if it is below 80%** This will be **given at the end of the term.** The **maximum score is 80%**

Enter your test grades in the table below:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____

Total Test Points = _____

Test Average = Total points ÷ (Number of Tests * 100)

The test Grade Average will count 50% of the final grade.

OTHER FACTORS AFFECTING FINAL GRADE AVERAGE:

If a student has attendance, cell phone, or inappropriate computer activity problems during lecture or lab, he/she can loose as much as 5% off the final grade for minor disturbances, or an F Grade for consistent major disturbances.

Items to improve Final grades:

1. **Professional attitude** for: Outstanding Attendance, on time, class contributions, and willingness to help others.
Add up to ½ point to Final grade.
2. A Two page typed report on approved electronics topic.
Add up to 20 points to lowest test grade.
3. Build approved kit outside of class and give a presentation to class.
Add up to 20 points to lowest test grade.
4. **Submit English Papers** on the Topics of: Lifelong learning, professional, ethical, and social responsibilities, respect for diversity and a knowledge of contemporary professional, societal, and global issues. **¼ pt for each**

CALCULATIONS OF FINAL GRADE POINT AVERAGE:

Test Grade Average _____ x .50 = _____

HW Grade Average _____ x .20 = _____

Lab Grade Average _____ x .30 = _____

Final Grade Point Average = _____

GRADES:**A. To pass the course all units must be taken.**

The grade is based on all Three items listed below.

All Three conditions must be met to receive a particular grade.

1. All Tests taken,
2. Minimum grade point average, and
3. Minimum number of labs completed. (A & B Labs Count as 1 Lab)

| <u>Grade</u> | <u>Final Grade Pt. Avg.</u> | <u>Tests Taken</u> | <u>Minimum Number of Labs Completed</u> |
|--------------|-----------------------------|---------------------|---|
| A | 90 to 100 | All | 10 |
| B+ | 85 to 89 | All | 9 |
| B | 80 to 84 | All | 9 |
| C+ | 75 to 79 | All | 8 |
| C | 70 to 74 | All | 8 |
| D | 65 to 69 | All | 8 |
| F | below 65 | 1 or more not taken | less than 8 |

B. Explanation:

For example, for a C grade you must take all Tests, complete the 8 required labs, and have a 70% (minimum) Final grade point average.

If you took all Tests, had an 83% Final average (qualifying for a "B" grade) but only completed 8 labs your grade would be a "C+".

In other words, all Three conditions must be met. Grade point average, all Tests taken, and a minimum number of labs completed to receive a particular grade.

EXPLANATION OF OTHER GRADES

1. If a **D** grade is received it will not satisfy the prerequisite requirement for the next course and it is not transferable to other colleges.
2. An **F** grade is assigned if any one of the Four conditions for a D is not met. An F can also be given for cheating, excessive absences, game playing, or academic misconduct. **Academic misconduct includes any misconduct or behavior of a student which disturbs the learning process in class.**
3. An **"I"** (Temporarily Incomplete) is rarely issued. An "I" grade will only be issued for a student that **was unable to show up for the last week due to a documented emergency.**

The "I" grade can only be assigned upon mutual agreement between the student and instructor if everything except the last week of work has been completed, and the student fills out the "Incomplete" form. The student must complete work within 30 days of the beginning of the next term, otherwise that "I" will automatically become an F.

The student must fill out the "I Contract" to receive an I grade.

4. **Withdraw** - If a student finds it necessary to withdraw from the course he/she **must do so before the ninth week** by notifying the instructor and registrar and by completing the withdrawal form.

After the ninth week the student will receive a grade based on work in the course. Do not expect to withdraw the "last day" of the course to avoid a failing grade.

Check with the registration office for the last day to withdraw.

5. An **"X"** or (extended incomplete) grade will be given for a final grade only if a student requests it and **fills out the "extended incomplete" form**. The "X" will become an F if the student does not retake the course within one year.
6. An **"AU"** (Audit) grade can be assigned to anyone who has the Division Chairperson's signature and notifies the instructor at the beginning of the course. Students who audit a course are excused from all tests and receive only an "AU" letter grade.

CALCULATORS:

During the first two weeks calculators will not be allowed for tests.
 The students will be given two weeks to purchase a calculator if they don't already have one. After that the students will be **required to bring them to Class for Labs and Tests.**

Cell phone calculators are not allowed for tests.

Useful features to look for when shopping for a calculator:

Common Functions:

| | |
|---------------------------------|--|
| $1/x$, $X \leftrightarrow Y$, | EE for entering a number in scientific notation +/- for changing the sign of a number or exponent |
| x^2 , \sqrt{x} , | SCI, ENG changes how the display represents powers of 10 notation |
| y^x , $\sqrt[x]{y}$ | |
| $\text{Log } X$, 10^x , | D↔R (Conversion between Degrees and Radians.) |
| $\text{Ln } x$, e^x , | π |

Trig Functions:

| | |
|-----|---------------------------------------|
| Sin | Arc Sin, Inv Sin or Sin^{-1} |
| Cos | Arc Cos, Inv Cos or Cos^{-1} |
| Tan | Arc Tan, Inv Tan or Tan^{-1} |

A convenient feature is **Rectangular to Polar coordinate conversion.**

R↔P button

Example of work saved by using this feature:

$$\text{Rectangular to Polar: } a + jb \Rightarrow M = \sqrt{a^2 + b^2}; \quad \theta = \text{TAN}^{-1} \frac{b}{a}$$

$$\text{Polar to Rectangular: } M \cos \theta + jM \sin \theta \Rightarrow a + jb$$

SUGGESTED STUDY PLAN:

1. Attend the lecture, lab sessions and the question/answer sessions.
2. Bring to Lecture Binder #1, containing the lecture and HW Packets.
3. Bring to Lab Binder #1 containing Lec. and
Binder #2 containing the Labs, and Instruction Guides
for Electronic Workbench and the Test Equipment.
4. Read over all your lecture notes.
5. Read the reading assignment given for the first Topic.
6. Answer the homework questions associated with this Topic.
7. Read the reading assignment given for the next Topic.
8. Answer the homework questions associated with this Topic.
9. Continue this format until all homework questions are answered.
10. Review the study guide HW questions, lecture notes, and labs
for the test (Study a minimum of 1 Hour.). If there are
no HW questions on a certain part of the lecture notes,
do not assume they won't be on the test.

RATIO OF CLASS TIME TO STUDY TIME

The ratio to class time to study time is expected to be 1:2. Therefore,
for the 4 credit hours of class time, **8 hours of study time are required.**

A student with **12 course credits** should allocate **24 hours of study time**
(outside of class time) for a total time allocation of 36 hours / week.

Do not expect to pass all your classes if you work full time (40 hrs/week)
AND have enrolled in a full time class load of 12 or more credits.