

BURLINGTON COUNTY COLLEGE

EET 131

Solid State Devices

SYLLABUS

FALL 2009

Course Syllabus Summary for EET131 SOLID STATE DEVICES

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

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

COURSE DESCRIPTION:

This course is an introduction to the characteristics, operation and application of solid state devices including diodes and bipolar and field effect transistors. Topics covered start with diodes, power supplies and the transistor switch. Also covered is DC and AC analysis of various types of amplifiers. Investigation begins with the bipolar - common-emitter, common-collector and power amplifiers. It concludes with the same analysis applied to the junction and MOS field effect transistor amplifiers. Laboratory experiments will cover the above topics and verify lecture theory.

I. Class Meetings:

3 hours per week class time allocated for Lecture / HW

3 hours per week class time allocated for Lab

II. Course Material: Textbook: **Electronic Devices (Conventional Current), 7th ed,** Thomas L. Floyd, Prentice Hall, 2005; ISBN 0-13-114080-9.

with EWB 7 Text ed. (15 parts max.)

A **3-ring binder** is required to hold supplied Lectures, HW, and Labs.

II. 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 Final Grade Point Average

Quiz Grade Average: 50% of Final Grade

HW Grade Average 20% of Final Grade

Lab Grade Average 30% of Final Grade

Final Grade:

A = 90 - 100

B+ = 85 - 89

B = 80 - 84

C+ = 75 - 79

C = 70 - 74

D = 65 - 69

F = 0 - 64

COURSE SYLLABUS for EET131 Solid State Devices**COURSE TITLE: Solid State Devices****COURSE NUMBER: EET131****SEMESTER CREDIT HOURS: Four****PREREQUISITES: EET 121 and MTH 130****INSTRUCTOR: _____ OFFICE: _____ PHONE: _____****COURSE DESCRIPTION:**

This course is an introduction to the characteristics, operation and application of solid state devices including diodes and bipolar and field effect transistors. Topics covered start with diodes, power supplies and the transistor switch. Also covered is DC and AC analysis of various types of amplifiers. Investigation begins with the bipolar - common-emitter, common-collector and power amplifiers. It concludes with the same analysis applied to the junction and MOS field effect transistor amplifiers. Laboratory experiments will cover the above topics and verify lecture theory.

RATIONALE:

Solid State Devices is required for the Electronics Engineering Technology program and the Computer Servicing & Networking Technology option, to prepare residents of Burlington County to qualify for job opportunities as an electronic technician.

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

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

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

What is accreditation? Accreditation is used to assure quality of programs in educational institutions. It requires our college and EET programs to 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 and Computer Servicing & Networking Technology programs 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 and Computer Servicing & Networking Technology programs 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 131**Course Learning Outcomes with Means of Assessment and Expected Performance Criteria**

Course Learning Outcomes Students should be able to:	Performance Criteria: A minimum of 70% of students will achieve at least a 70% for the following activities:
1. Identify the characteristics of, analyze and solve problems for Diode and Transistor circuits.	a) Test # 1-4 (Imbedded test questions) (Correct Ans.) b) Individual Skills Assessment Lab (Evaluate with a rubric)
2. Use test equipment to perform measurements	a) Lab 0 Scope Meas. Techniques Lab (Correct Ans.) b) Individual Skills Assessment Lab (Eval. with rubric)
3. Use electronic circuit analysis software (MultiSim) to draw schematics and / or analyze circuits	a) Lab 0, Scope & EWB Techniques Lab (Correct Ans.) b) Individual Skills Assessment Lab (Evaluate with a rubric)
4. Build circuits on a Protoboard from a schematic	Individual Skills Assessment Lab (Evaluate with a rubric)
5. Demonstrate a proficiency in soldering printed circuit boards	Individual Kit Soldering Skills Lab (Evaluate with a rubric)
6. Given circuit specifications, apply knowledge learned in the course to creatively design or build the circuit, interpret results, and apply results to make improvements where applicable	a) Individual Skills Assessment Lab (Evaluate with a rubric) b) Individual Test to Design a Power Amp to given individual design specifications. (Correct answers)
7. Communicate effectively through written reports	a) Individual Oral Presentation on an individual problem solution (Evaluate with a rubric)

Contribution of Course Learning Outcomes to meeting Program Educational Objectives

Course Outcome #	Program Educational Objectives
	Graduates the first few years after graduation should be able to:
1 - 7	1. Find employment as a technician or transfer to a four-year college,
1 - 7	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,
1 & 6	3. Apply knowledge of analog and digital electronics and use mathematics, scientific principles, and critical thinking to creatively solve technical problems,
3	4. Utilize computers and software in a technical environment, and
7	5. Communicate effectively both verbally and in writing

Relationship of Course Outcomes (#) to Program Outcomes (a, b, c...)

Course Outcome #	Program Outcomes – Graduates should Demonstrate:
2,3,4,5	a. an appropriate mastery of the knowledge, techniques, skills, and modern tools of their disciplines,
6	b. an ability to apply current knowledge to new applications,
6	c. an ability to conduct, analyze, and interpret experimental results and apply results to make improvements where applicable,
6	d. an ability to apply creativity in the design of circuits, systems or processes,
1	f. an ability to identify the characteristics of, analyze and solve technical problems, and
7	g. an ability to communicate effectively through writing and oral presentation

SOLDERING SKILLS ASSESSMENT EXAM will be given during the last lab period. **This will count as 1 Lab that cannot be dropped.** This lab will test for soldering skills in assembling a PC board kit.

EET 131 Course Outline

Unit/Lab #	Unit - Lecture / Lab Titles		
Lab 0	Advanced Scope Measuring Techniques		
Unit 1	Diodes-Diode Theory, Rectifier & Zener Diodes, LED's and LASER diodes		
Lab 1	Part I: Testing the Diode with a VOM vs. DMM Part II: Comparing Voltage Regulation of Zener vs. Loaded Voltage Divider		
Unit 2	Power Supplies – Half and Full wave		
Lab 2	Part I: The Half and Full Wave Power Supply Part II: The Full Wave Power Supply for Auto Accessories		Test 1 - Units 1 & 2
Unit 3	The BP Transistor- Theory, Testing, IV curves and the Transistor Switch		
Lab 3	Testing Transistors, Reading Data Sheets, and The Transistor Switch		
Unit 4	BP Transistor Amplifier DC Biasing		
Lab 4	BP Transistor Voltage Divider DC Biasing Analysis		Test 2 - Units 3 & 4
Unit 5	<u>AC Analysis I</u> - Common Emitter (CE) Amp - DC & AC Equivalent Circuits, $A_{V(AC)}$ Calculations, the PNP CE Amp, and OP Amp Introduction		
Lab 5	CE Amp - A_V meas., waveform Analysis & Calculations w/o & with Emitter Bypass Cap and with & w/o Load		
Unit 6	<u>AC Analysis II</u> - Common Emitter (CE) Amp - Calculation of Z_{in} & Z_{out}, Cap sizes, Op Amp single supply Non-Inv Amp and OP Amp Z_{in} & Z_{out} calc		
Lab 6	CE Amp Analysis of Z_{in} , Z_{out} , and Non-Inv Op-Amp Analysis of A_V , Z_{in} and Z_{out} .		Test 3 - Units 5 & 6
Unit 7	Common Collector (CC) or Emitter Follower (EF) and Darlington - DC & AC anal. NPN & Upside Down PNP CE Cascade (Multi-Stage Amp) & CE AC Analysis		
Lab 7	AC analysis of the Darlington EF Amp.		
Unit 8	MOSFETS – Intro, CS Amp, Source Follower, and Power Switching		
Lab 8	Big Ear Amp		Test 4 - Units 7 & 8
Unit 9	Power Amplifier DC Analysis		
Lab 9	Build an Op Amp – Class AB Transistor Power Amp. on Protoboard and perform DC Analysis of the P.A.		
Unit 10	Power Amplifier AC Analysis Including Negative Feedback and MOSFETS		
Lab 10	AC Analysis of the Power Amp with Negative Feedback		Test 5 - Units 9 & 10
Unit 11	Oral Presentation of a Problem Solution		Test 6
Lab 11	Lab Skills Assessment & Soldering Skills Assessment	(No Drop)	Labs 11 & 12
Unit 12	Oral Presentation of a Problem Solution		Test 6
Lab 12	Lab Skills Assessment & Soldering Skills Assessment	(NO Drop)	Labs 11 & 12

COURSE MATERIALS:**A. Required Text:**

Text: **Electronic Devices, 7th ed**, Thomas L. Floyd, Prentice Hall, 2005; ISBN 0-13-114080-9; with EWB 7 Text ed. (15 parts max.)

B. 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.

C. Lectures:

The student will receive printed copies of all lectures, laboratories and HW. Keep all printed material in a three-ring notebook, so they won't get lost. (See F below)

D. HW packet:

1. **Reading assignment** - will divide up the reading for the week by topic.
2. **Homework** questions and problems - are divided up to generally match the reading assignment on a topic by topic basis.

The divided up Reading and HW activities will guide the student thru the unit.

E. Laboratories:

For each unit there will be a laboratory covering the unit's topics. Laboratories will generally include:

1. Rationale / Objectives
2. List of equipment
3. References / Introduction / Set Up
4. Data
5. Calculations and / or Questions
6. Conclusion

F. Two ½" Three-Ring Binders (Purchase)

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, 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 12, 14 and 16.

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.**

LAB GRADE: Lab Grade Maximum is 10 Points & Counts 30% of Final Grade**1. Day One**

Remove staples from Lab Packet. Put separated Lab Packet into Binder #2 along with the Ancillary Packet material. Staple labs separately when turning in.

2. Lab Double Check System:

- a. **1st Check Off** is worth **5 points** and is given when:
Initial data and calculations are correct.
The lab must be set up for first check off so if there are any mistakes, the set up can be checked for errors.
 - b. **The conclusion** is worth 2 Pts. of the 2nd Check-off, or 20% of the total lab grade. The conclusion must be typewritten using the format shown on page 9. At the end of the lab turn in your group's conclusion to the lab instructor for evaluation & only leave lab after the instructor returns evaluated conclusion.
 - c. **2nd Check Off** is worth an additional **5 points** and is given when:
 The lab report is complete, neat, and handed in on time.
- 3. Attendance:** Attendance will be taken during lab. Students **must stay for the full duration** based on Board Policy, unless they complete the **entire lab** and have permission from the instructor to leave early. **Points will be taken off Lab Grade for time missed during Lab.**
- 4. Lab Due Date:** Labs are due the next lab period for full credit. **Labs turned-in 1 week late will be penalized 1 point (1 letter grade). Labs turned-in 2 weeks late will be penalized 2 points (2 letter grades). Labs more than 3 weeks late will be penalized 3 points (3 letter grades).**
- 5. Make-up labs** There will be one day near the end of the semester when make-up labs can be done. Full credit will be given for a make-up lab provided the instructor's signature with the date is on the lab, and if handed in one week after performing the lab. This is important because to receive credit for a make-up lab you must have this signature and date.
- 6. Electronic Workbench** analysis of some labs is **worth 1 pt.** of the 5 points in the second check-off **or 10% of the total lab grade** unless noted.
 (Note: If the EWB part of the lab cannot be done during lab, it can be done outside of class time in the library.)

For a complete lab, two signatures are required and a maximum of 10 points given. If a lab is not handed-in no points will be given for that lab.

Enter your lab grade points in table below:

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

Drop Lowest Score except Skills Labs #11 and #12 Total Points = _____

Lab Average = Total points ÷ Number of labs assigned.

Lab Grade Average will count 30% of the final 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 or wrong prefixes and/or 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 HW Maximum Grade is 5 Points & Counts 20% of Final Grade**Question/Answer Session Grading:**

At the end of the question/answer session, HW will be collected. The HW grade is 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>
5 Pts		90
4 Pts		80
3 Pts		60
2 Pts		40
1 Pt		20

- 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 steps in calculations 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. _____

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. _____ 6. _____

Total Test Points = _____

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

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

OTHER FACTORS AFFECTING FINAL GRADE:

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

Items to improve Final grade:

1. **Professional attitude** for: Outstanding Attendance, on time, class contributions, and willingness to help others.
Add up to ½ point to Final Grade.
2. Four 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.

<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	12
B+	85 to 89	All	11
B	80 to 84	All	11
C+	75 to 79	All	10
C	70 to 74	All	10
D	65 to 69	All	10
F	below 65	1 or more not taken	Less than 10

B. Explanation:

For example, for a C grade you must take all Tests, complete at least 10 labs, and have a 70% (minimum) Final grade point average.

If you took all Tests, **had an 83% Final average** (qualified for a "B" grade) **but only completed 10 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 final 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:

Students are **required to own** and know how to operate **a calculator** for HW, **and bring 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\leftrightarrowR (Conversion between Degrees and Radians.)
$\text{Ln } x$, e^x	π

Trig Functions:

$\text{Sin} \Rightarrow \text{Arc Sin, Inv Sin or Sin}^{-1}$

$\text{Cos} \Rightarrow \text{Arc Cos, Inv Cos or Cos}^{-1}$

$\text{Tan} \Rightarrow \text{Arc Tan, Inv Tan or Tan}^{-1}$

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

R \leftrightarrow 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
4. Read over all your lecture notes.
5. Read the reading assignment given for the first objectives.
6. Answer the homework questions associated with these objectives.
7. Read the reading assignment given for the next set of objectives.
8. Answer the homework questions associated with these objectives.
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.