An Instructor's Guide for Using the Gordon West General Class

Amateur Radio FCC Element 3 Study Manual
Valid July 1, 2011 to June 30, 2015
Welcome & Thank You!

This Instructor's Guide for teaching the 2011 to 2015 General Class Element 3 precisely parallels all of the REORGANIZED questions, answers and descriptions in my red General Class study manual. My reorganization of the entire question pool will cut your teaching time in half, and will help your students better understand and learn the material!

Now that the FCC has eliminated the Element 1, Morse code test, everyone is moving up to General Class license preparation. With fewer than 500 active ham radio instructors throughout the country, your job in teaching the General Class question pool is important for the growth of ham radio. This General Class Instructor's Guide will help you develop some lively class sessions and help you with some great on-air demos.

If you are new to teaching a class in ham radio, this Instructor’s Guide will keep you on track! You do not need to be a technical expert to teach General Class. Likely you will find your first class session with plenty of technical experts actually taking the course. With their help, everyone learns!

This Instructor’s Guide for General class is based on my 40 years of offering amateur radio training courses. This booklet will encourage you to offer classes as part of your local ham radio club, your local community college system, or perhaps as a park district class. The booklet provides lesson plans that can be used for a 12-week community college semester; your local club’s 10-week, 3-hour evening seminars; or my most-asked-for class format – a weekend course that runs from Saturday morning through Sunday afternoon. This booklet covers all three options.

This Instructor’s Guide parallels my completely reorganized General Class study manual for the Element 3 Question Pool, valid July 1, 2011 through June 30, 2015. Questions are written to the reading comprehension of middle school students, and the focus is on current ham radio techniques for the new operator.

I have completely reorganized the questions into 18 topics, bundling similar type questions into logical groups that can be taught as single “hot topics.” This reorganization of the pool will cut your teaching time in half, and give you more time for actual “on-the-air” practical demonstrations.
IMPORTANT: If your students are using an alternate book, the Q&A order will not be the same as they are in this Instructor’s Guide and in my own book. This guide parallels only the Gordon West General Class theory book.

My General Class study manual includes many web addresses for further student study after class. It has lots of “Ham Hints” – practical operating tips for the new operator. And it also presents keywords printed in blue that your students will review just before the exam.

You probably know, there’s nothing like “hands-on ham” to get beginners excited about our hobby. Demos are the key to lively classroom sessions that get your students talking on-the-air, learning about how radios work, or understanding the fundamentals of electronics. I want to recommend an excellent book to you that you can use as a “lab book” to help with your classroom demonstrations. It’s Getting Started in Electronics by Forrest M. Mims, III. You can obtain a copy from The W5YI Group, the same place where you can purchase copies of my General Class book for your students. You’ll see some of the nifty experiments from Forrest’s book here in my Instructor’s Guide, and it will help you put on memorable demonstrations in class that will bring understanding to your students of some of the electronics involved in our hobby.

Our thanks to Forrest Mims for his permission to use some of the illustrations from his book in this Instructor’s Guide. Please note, all of the material from Getting Started in Electronics is copyright © 1983 and 2000 by Forrest M. Mims, III, and may not be used without permission.

Good news – the General Class Pre-Study quiz pages in the back of this Instructor’s Guide MAY BE REPRINTED without permission! I have provided you with homework for each student to keep them busy during the class week, or to help them pre-study the book before the class weekend. DUPLICATE THIS PRE-STUDY!

This Instructor’s Guide also tells you where you can purchase books at an instructor’s discount, and how to obtain free training materials like ham wall maps, frequency charts, manufacturer discount coupons, and graduation certificates.

So let’s get started to see what it takes to teach amateur radio General class upgrade courses.

Gordo
How This Instructor’s Guide Is Organized

After 40 years of teaching ham radio classes, I can tell you what works and what pitfalls to avoid. Some are real classics! In this Instructor’s Guide for the 2011-15 Element 3 General class question pool, I am going to share with you every teaching secret I know. Here’s how we are going to teach you, THE TEACHER:

Weekday Evening Classes or Weekend Seminars? ........................................ page 5
Go It Alone or Team Teaching? ................................................................. page 7
Advanced Promotion Before the Course Assures Big Class Size ............ page 8
Classroom Tips for Teaching Success ....................................................... page 9
Now It’s Time for Your Homework! ......................................................... page 11
General Class Instructor Course Outline ................................................ page 14
Demos & Props / Show & Tell Will Make Your Classroom Lively ............ page 16
Resources ..................................................................................................... page 23
An Invitation to Sit-In & See for Yourself ................................................ page 26
2011-15 General Class Student Pre-Study Q &A........................................ Page 28

THE REAL LEARNING STARTS HERE

Do you know where the real learning of ham radio occurs? If you think it happens in your classroom, you are partially correct. But the real learning of amateur radio occurs ON THE AIR. That’s why the live demos in class are so very, very important. It exposes your students to the fun and excitement of live ham radio in action.

For your students, the real learning occurs when they begin operating over the airwaves. Encourage your Technician Class students to try more things than just FM repeaters – IRLP, Echolink, tropo ducting – encourage your students to get active with their current Technician Class privileges!

To encourage them on their preparation for General Class high frequency operation, my General Class book contains a one hour audio CD. This audio CD plays all of the excitement on all of the General Class high frequency bands. Your students will hear all of the worldwide radio sounds that await them!

UPGRADE TO GENERAL CLASS

Your upcoming General Class course is specifically for Technician Class operators with a valid Technician Class license. Technician Class is a prerequisite. This makes your ham radio orientation easy – hopefully, most of your students have been on the air, and already understand what ham radio is all about!

So remember, getting the Amateur radio license to operate on the air is really like getting a license to begin learning ham radio! You’re role is to help the students get started!
Weekday Evenings, or Weekend Seminars?

What is the best time to have your amateur radio General Class course? A 12-week class gives you plenty of time, and 9-week classes fit well into community college curriculums. A weekend class is my ultimate favorite, but it only works when you use the tricks I’m going to share with you on how to get the students working their pre-study homework ahead of class. Let’s review the pros and cons of each approach to scheduling your classes:

**WEEKNIGHT CLASSES**

It takes about 20 hours to completely cover all 456 test questions in the new Element 3 question pool. When you review my book, you’ll see that I have taken the 456 total questions and reorganized them into 18 topic groups. By doing this, the question pool is now much more manageable, and all 456 Q & A’s can be covered during 8 to 12 classroom sessions, each about 3-hours long, meeting once-a-week in the evening. Good class hours are 7 to 10 pm, but students may vote for 6 to 9 pm as an alternative.

If you offer a weekly General Class upgrade ham class course that may last up to 12 weeks, the first week’s session may be devoted to the ham radio introductory chapters, and the final week’s session for the actual Element 3 exam. Twelve classes held once a week for 3 hours will require minimal homework or pre-study on your student’s part. I’ve found that most students taking a 12-week course only do a minimal amount of homework before each class session, so the real learning only takes place in the classroom.

The 12-week class will result in an approximate 50 percent attrition rate. If you start with 30 students, you’ll be lucky to end up with 15 graduates. You can be the best instructor in the world, but keeping your students on a 12-week schedule is next to impossible with everything around them changing on a daily basis. So be prepared to lose half of your students if you decide to hold a 12-week course.

**WEEKEND SEMINARS, SATURDAY & SUNDAY**

The most popular courses I teach throughout the country continue to be my 2-day weekend seminars. They begin Saturday around 8 am and go ‘til 6 pm, and resume on Sunday from 8 am to test-taking around 4 pm, with graduation at 6 pm.

The big selling point for the weekend General upgrade ham radio seminar is your students think that in just one weekend they will end up with their license. And they do. But what they might not factor in for this weekend class will be the pre-study you begin to send them before class. Weeks before. Sometimes months before!

The pre-study is not hard, and you will see it in the back of this *Instructor’s Guide*. The pre-study gets the students to study ahead of time, and leads them by the hand and pencil through their regular Gordon West *General Class* book, looking over all of the 456 questions in a reorganized 18-topic program. We give them the actual page number and sometimes the actual question number to fill in the blanks on their home-study. They think the home-study is so easy that they indeed get totally through it before the class begins. You have now successfully trained these students to pre-study ahead of time and get a big jump on classroom instruction.
The attrition rate you can expect in a weekend 2-day seminar-style course should be less than 10 percent. You also will draw much larger numbers of students to the weekend seminar compared to the 12-week community college or ham club format. I went from evening classes at 12 to 15 students per class all the way up to an average of 75 students for each weekend course for the entry-level Technician class license. Upgrade weekend classes for General class average more than 50 students. For the Extra class, now that there’s no longer any code test, I usually end up with 30 to 40 in the weekend class.

The biggest thing for you to promote about the weekend class is that the upcoming course is absolutely not a “cram class.” Make sure everyone knows that you are teaching ham radio, not just teaching the 456 Q&As in the scrambled Element 3 question pool. If you were to try to teach the 456 questions in numerical order as originally presented by the Question Pool Committee, it might take you THREE WEEKENDS to complete a successful seminar! But by following the 18 logical topic groups in my book, you can easily teach the entire 484 question pool in a weekend if you stick to the time line presented here in your Instructor’s Guide.

PRE-STUDY FOR WEEKEND SUCCESS

The popular weekend class should be preceded with student pre-study homework. Students are expected to sign up well before the class, and you will send them pre-study, fill-in-the-blank homework before the big weekend seminar. The students will fill in the correct answer from what they read in my 2011-2015 General Class book. The questions in the pre-study homework precisely follow the reorganized Q&As as presented in my General Class book.

Pre-Study Q&As that guide students using my General Class book and/or my exclusive audio theory course on 4 CDs is included at the end of this booklet, starting on page 29. Feel free to copy these Pre-Study Q&As and pass it out to your students. It is written for the weekend seminar, but can easily be adapted as homework for a weeknight 10 to 12 session course. The pre-study assures that students will open up the book ahead of time. The students will not need to search for any answers – almost all of the pre-study topics illustrate what pages the material may be found in my General Class book.

In addition to the fill-in-the-blanks home-study workbook, I also expect the students listen to the 4 audio CDs that I have recorded that cover General theory. While the audio course is “extra credit,” it increases their enthusiasm for the class, and tunes them in on what to expect when they begin operating on the air. When the students listen to the audio course, it really brings ham radio TO LIFE!

And be sure your students play the audio CD in the front of their General Class book. It will really give them a preview of the fun that awaits them on the worldwide HF bands.

You may wish to have your students study the computer course that also is available from The W5YI Group. The computer course carries my same description of the correct answer, and some students prefer to study at their computer rather than simply read the book.
When your weekly or weekend students hit the classroom, you will know immediately which students will be passing the examination with flying colors because they are the ones who have worked their home study ahead of time. A few might not have any home study completed at all, so you may wish to reschedule them for a different class at a date in the future – or at least warn them that without home study the weekend class probably won’t be a success for them.

**WEEK NIGHTS, WEEKENDS, OR BOTH?**

So you need to make a decision – are you going to teach a relaxed 10- or 12-week evening series of ham classes, or are you going to do a one weekend seminar based on home study ahead of time? If you are looking to attract and graduate a larger number of students, I guarantee that the weekend seminar is a great way to go.

Or, do as I do, teach both – offer the traditional 12-week evening course with your local community college or ham club, and then have a few one-weekend licensing seminars for those who can’t take 10 or 12 weeks out of their busy schedule for a once-a-week evening class.

**GO IT ALONE OR TEAM TEACHING?**

To be a great instructor, you must have plenty of pizzazz and presence. It takes a lot more than in-depth knowledge of amateur radio to make you a good presenter. You need to learn how to read your students, and how to get them involved in the material. That’s why the props and demos we’re soon to talk about are so essential.

If you plan to do the weekend class all by yourself, you better be in great physical and mental shape. By the time Sunday evening rolls around, you’ll just about collapse from the frenetic effort required to teach so much material in so little time.

In this *Instructor’s Guide*, I will soon be showing you how to make the complex simple. We’ll talk about a light bulb beginning to glow, or getting two of your in-class engineers to figure out why in the world the magnet that you dropped through the hollow aluminum tube defies the law of gravity and makes an ever-so-slow exit.

I encourage you to have additional help in the classroom, especially if you’re doing one of the weekend marathon sessions. But team teaching is a lot like acting on stage, and you need a script to follow in order to keep the class on schedule and make sure you cover all the material. If you select a good teaching partner, make sure they use the course outline following the book as their guide. You can split up the topics to be covered between you. That way you each can devote more energies to fewer topics. The result will be a better course for your students, and less work for you! Also, you can recruit help from any one or two other hams to put on a couple of special demos that illustrate important material.

But a word of caution – you need to carefully choose your assistant instructors because even the most knowledgeable technical ham may not have the skill to “read” their audience and will put them into nod-off land. The well-meaning, overly-technical ham will go on and on and
on, and this zaps your teaching time line instantly, and it will take you the rest of the class session to catch up. Don’t let this happen! While it’s great to explore the fascinating world of PSK-31, and while it would be fun to do a one-hour presentation on this new frequency saving digital mode, keep in mind that there may be only two questions out of 45684 on this subject, and unfortunately, you can only give it a couple of minutes and encourage students to stick around after class and watch a live PSK-31 demo take place.

**Advanced Promotion Before the Course Assures Big Class Size**

It pays to advertise! You know that, of course. And if you want to attract enough students to your ham radio class, you need to get the word out.

Here’s a sample flyer that has been successful for me in promoting entry-level ham classes. Please feel free to use any of the wording that you like to help promote your upcoming class. If you have a local ham radio dealer near you, they will probably be more than happy to put your class flyers right up front. Remember, everybody who graduates from your class will be wanting to buy ham equipment, and I always recommend going to a local dealer that is helping support your class.

If you are teaching your class for a specific audience, such as boaters, emergency squads, pilots, RVers, or model airplane flyers, each of these organizations usually has specialty stores that would probably be more than happy to help promote the class. And don’t forget to put a notice on their websites or in their e-mail newsletters.

Once you set your class date, please contact The W5YI Group instructor program and let them know your schedule. Many times prospective hams call the W5YI-VEC asking where there might be a class, and they’ll recommend your class to students calling from your area.

Go to: [www.haminstructor.com](http://www.haminstructor.com)
To register your upcoming classes on the W5YI website

Let local amateur radio clubs know you are teaching a class for beginners. Often, they will have students to send you! Clubs also can help get the word out, and every ham club loves to see more members join up, and more newcomers get into our hobby. So regularly work the clubs, support what they are doing, and you’ll probably find they will support you in a big way!
Classroom Tips for Teaching Success

Where you hold your class depends on many factors. The organization that is sponsoring you may provide the space. You may have to ask the local school for a classroom. If you’re doing a weekend seminar and are attracting students from wide area, you may want to find a hotel with meeting rooms, food service, and hotel rooms for those students who want to stay overnight.

SETTING UP YOUR CLASSROOM

Try to select a classroom that will allow you to gain access to an outside area to set up some simple HF dipole and HF vertical antennas. This allows you to go on the air during classroom sessions, which dramatically spics up your teaching with on-the-air demos.

I prefer to run the coax out windows where there’s absolutely no chance that someone might trip over the cable. Be careful to never create a hazard by running the coax where someone might trip. Make sure no one can get anywhere near any antennas that you plan to transmit on. Also, make sure that you don’t put up any antenna that has protruding metal spikes that could catch on clothing or cause injury to a student who doesn’t see it in the evening. SAFETY is your most important consideration when laying out your classroom demos.

Here’s a great trick I want to share with you. This is how I have the students seated within the classroom. I always prefer that students sit at a table. But if the 6-foot or 8-foot tables are horizontal to the instructor, this means you can only get a maximum of 3 students per table.

Turn the tables vertical to you, as shown, and put 3 chairs on one side and 2 on the other to accommodate 5 students. If you have 3 rows of 3 tables per row, try putting 3 chairs on one side, and 2 on the other for an 8-foot table, or 2 and 2 for a 6-foot table. You’ll be surprised how many more students you can pack into a very small room without them feeling overcrowded. Leave enough room in between the rows of tables so you can easily walk up and down between the tables, looking over their shoulder to see how well your students are doing.

I usually have three 8-foot tables up front for my demo gear. I call it my “show and tell” stuff, and it is one of my biggest successes for a class that everybody talks about. Bringing loads of demo gear allows you to pass around 2 or 3 small audio transformers at the same time. Then 2 or 3 resistors at the same time. Three coils, 3 transistors, 3 chips, 3 pieces of coax cable – you get the idea – every time you talk about something electronic in class, start the demo gear moving up and down the tables.
Now, beside the insides of a radio in a gazillion pieces all kept in plastic bags and marked so they can inspect everything, make sure you have a minimum of a dual-band radio in the classroom for 2 meters and one other UHF band, plus a worldwide radio to let your students listen in on all of the excitement that is out there. These radios go to live outside antennas, and this further adds to the excitement of your ham class. The more stuff you have, and the more live demos, the more students are going to hear about your technique of teaching, and they will be waiting in line to sign up for your next class!

In the Resources section of this Instructor’s Guide, I show you listings of web addresses where you might contact amateur radio manufacturers and bring in colorful wall charts. These wall charts will help dress up your classroom and allow you to point things out so everyone can see. In addition to the wall charts, The W5YI Group may include maps and frequency charts with each textbook you order from them. This way you can lay the charts out for each student when they first enter the classroom on day one. Visually, this adds excitement when they come in to take their class and see that they already have things waiting for them right at their seat.

**NAME TAGS**

Here’s a sample of a stick-on student name tag. This is another great icebreaker! In very large letters, print each student’s first name on their tag, and have them wear the tag for the first few class sessions. Remember that the first impression you make is always a lasting one, so you want to make your first class session a rousing success. This means make all students feel comfortable, and the big name tag certainly helps.

And I give out an inexpensive ribbon to those who successfully pass my course and get their license. It may seem “corny” but it works. Everyone relaxes and has a good time!

As you get close to your first class session, contact your students via e-mail, letter, or phone, and double check that they know exactly when the class is scheduled, and where the class is going to be held. Go over every detail including parking. Double check to see if you might have some handicapped students who may need a special parking spot, or special accommodations to the classroom.

Several years ago I developed a video specifically for instructors on how to teach a ham class. The video is available from The W5YI Group. Call 800/669-9594 to find out how to get your copy of this videotape that will show you how I get things going on the first night in ham class.
Now It’s Time for Your Homework!

Before I start you out with your class outline, we need to make sure you are absolutely up to date on all that has changed in ham radio over the last couple of years. In my *General Class* book, I bring everyone up to date on a little ham history, privileges your students will earn, preparing for the class, taking the class, and ultimately passing the final exam. So instructors, the following is YOUR homework assignment before we begin to teach General class.

**Your assignment:**

Begin by listening to the one hour audio CD that accompanies your students’ *General Class* book. There are some exciting sounds that you may wish to play in class as part of your demonstrations.

**READ & REVIEW PAGES v AND vi - SKIM CHAPTER 1**

These first 2 pages will help motivate your students to follow a logical study plan to ultimately obtain their amateur license using their book and working with you, their instructor.

Next, skim Chapter 1 on pages 1 through 8. Chapter 1 briefly describes to your students the excitement awaiting them as ham radio operators, the need for an FCC license, and encourages them to join a club, read magazines, and get an Elmer to show them the ropes. Chapter 1 fully explains all of the frequencies they will earn with JUST their General class license that they will achieve in your upcoming class. Chapter 1 has some excellent band plans that illustrate all of the excitement on the popular HF bands. Since YOU have already been on the air, you can skim the privileges, but please note that on page 2 I show them all of the new frequencies they will earn in an easy-to-read table. Combine this with the frequency charts that accompany each book you are bringing in for your students, and you’ll have no problem showing them all of the “radio real estate” they will soon gain as a new General class operator!

**Your assignment:**

**CHAPTER 2 IS IMPORTANT FOR YOU! A LITTLE HAM HISTORY**

I suggest that you carefully review this important chapter to better understand all of the changes to our current amateur radio service. By thoroughly understanding the ham radio history you will get a broad perspective on how relatively easy it is for your new students to pass their General exam and get on the HF airwaves. This chapter may help you better understand some of the resentment felt by our senior hams who complain the testing process is not tough enough – certainly not like the old days when they HAD to learn Morse code.

And this is why we suggest you teach a little bit of CW in the classroom – a little code instruction will satisfy some of our senior hams who might worry that we are simply teaching the test and skirting the code issue. Once they see the work that you’re putting in to your teaching in the classroom, and they hear the dits and dahs, they will probably join you as a guest instructor. This is good!

*Gordon West’s Instructor’s Guide for 2011-15 General Class – Page 11*
CHAPTER 3 GETS YOU READY TO TEACH THE COURSE

Chapter 3 – *Getting Ready for the Exam*, is another important chapter for you to know and understand before you start your class. In this chapter, I topically describe to the students the yearly update process of individual amateur radio question pools. I advise the students that an older book with the old question pool will not reflect the new updated General class question pool, valid 2011 through 2015. Let them know that many questions are asked two and three times over with slightly different wording. This means they are only studying around 150 question topics.

Page 18, *Table 3-1*, shows the new Element 3 syllabus, total questions in each sub-element, and the number of questions taken from each subelement to make up their 35-question exam. Many students will be worried that the electronics portion of the test will be tough for them – but if they look at subelement G7 in this Table, they’ll discover that only 2 test questions on their upcoming exam will be taken from this subelement. They’ll breathe a sigh of relief! Only one schematic in this new pool, and no block diagrams.

**Your assignment:** Turn to page 20

*WHY I REORGANIZED THE QUESTION POOL*

Pay careful attention to pages 20-21. This explains why I decided to reorganize all of the Q&As in the new 2011-15 Element 3 pool into the 18 logical topic groups. Here’s some background.

Each of the three amateur radio question pools is developed by the National Conference of Volunteer Exam Coordinators’ Question Pool Committee. The abbreviations are “NCVEC” and “QPC.” When the QPC developed the new 2011-15 Element 3 question pool, it was shortly after the Federal Communications Commission “re-farmed” the high frequency bands, allowing for expanded voice privileges and the re-defining of CW/data frequencies. This was also the time the FCC released its Rule Making that eliminated the Element 1 CW test requirement. These recent FCC actions have ALL been accounted for in our new *General Class* 2011-15 training manual, and this *Instructor’s Guide* for teaching General class.

The Question Pool Committee also eliminated older General Class questions that were no longer valid with new technology. The QPC also ADDED new General class questions to better reflect the new technology in high frequency ham radio communications. This makes this new question pool FRESH, and that makes it easier for you to teach!

The new question pool, consecutively numbered by the QPC, continues to present an illogical grouping of similar questions, separated haphazardly throughout the pool. As one example of our reorganization efforts, several questions on PSK 31 were originally grouped in both Subelement G2, Operating Procedures, and over at Subelement G8, Signals and Emissions. In my new *General Class* book, I have grouped PSK 31 questions together in digital operating, placing all 4 questions, one after another, for easy teaching.

Each question and answer choices in the book is followed my upbeat description of the correct answer. And NEW in this book is another terrific study aid – the correct A, B, C, or D
answer is listed at the END of the description, not tipping the student off BEFORE the description! This way, your students will read the entire description of the correct answer, and then verify that the correct answer they chose is, indeed, the correct answer on the exam.

Are all of the 456 questions in the book? Absolutely! Look at page 210 and 211, and see the cross-reference of the QPC question order and the specific page where it appears in the book. And a quick glance at our page numbers in this cross-reference will clearly show you our unique reorganization of the entire question pool was needed!

I have been using this rearranged teaching technique for the last 40 years – going all the way back to Novice class – AND IT WORKS! This rearranged question technique also allows you to bring in additional books to further illustrate a specific topic. Best of all, you won’t need to jump around in your training materials because I have grouped all of the 18 logical areas together. And I purposely don’t blow our students away by starting out with Ohm’s Law. I get them baited and on the hook by first reviewing all those questions dealing with the excitement of high frequency operating on their new General class frequencies.

TEACH YOUR CLASS BY THESE TOPIC AREAS

Don’t skip around in the book – I have completely minimized the need to do that in THIS book. Look again on pages 20 and 21 and go with the flow of this logical instruction method. This is the same order that I use to present the material in my audio course, and our computer course includes my fun explanations from the book. My book, the audio course, and the software are available through The W5YI Group Instructor Program, and for a discount, too.

Now check out our cartoon friend Elmer, who provides numerous Elmer Points in shaded boxes surrounded by a CW border. This breaks up the copy and adds a smile to your instruction. Elmer and his Points add important substance to specific questions in the pool. Then check out WEB SITE RESOURCES, also in a shaded box, specifically for you and your students to obtain additional information with accurate www web locations. These web addresses will assist you in some simple homework assignments for once a week classroom sessions.

So please trust me on this one. I’m out there teaching these classes all over the country, and the reorganized questions are a much more logical way to instruct your students. Stay with the book, page by page, no jumping allowed!
General Class Instructor Course Outline

The course outline you are about to read works for both the weekend seminar as well as 10- and 12-week evening classes format. The course outline specifically parallels my *General Class* book for 2011-2015. I rearranged all of the Q&A in the new question pool into 18 topic groups based on how you should teach General class, presenting the material in a logical order and making it easier to learn!

**If your students are using another book, the Q&A won’t be in the same order as they are presented in my topic groups, and the “other book” students will quickly get lost.**

As a professional instructor yourself, I value your comments about where a couple of questions might be moved around to improve the presentation of the Q&A. We can do this easily when we next reprint our book, so let’s hear your suggestions. If your suggestions make the book, I will acknowledge you up front in the beginning of the book, too!

Here are the 18 topic areas, grouped into class sessions, based on a 12 week course. You may combine groups for a shorter class schedule. You should be able to cover all of the topics included in each group during the course of a 3 hour session.

<table>
<thead>
<tr>
<th>Session No.</th>
<th>Topic Areas</th>
<th>Pages to Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Ham Radio</td>
<td>v through 22</td>
</tr>
<tr>
<td>2</td>
<td>Your Passing CSCE</td>
<td>23 - 25</td>
</tr>
<tr>
<td></td>
<td>Introduction to General Class bands</td>
<td>26 - 33</td>
</tr>
<tr>
<td></td>
<td>FCC Rules</td>
<td>34 - 41</td>
</tr>
<tr>
<td>3</td>
<td>How to become a Volunteer Examiner</td>
<td>42 - 43</td>
</tr>
<tr>
<td></td>
<td>Voice Operation</td>
<td>45 - 53</td>
</tr>
<tr>
<td></td>
<td>CW Lives!</td>
<td>54 - 61</td>
</tr>
<tr>
<td>4</td>
<td>Digital Operation</td>
<td>62 - 70</td>
</tr>
<tr>
<td>5</td>
<td>Emergency Communications</td>
<td>71 – 73</td>
</tr>
<tr>
<td></td>
<td>Introduction to Skywaves</td>
<td>74 - 80</td>
</tr>
<tr>
<td>6</td>
<td>Skywaves and Propagation</td>
<td>81 - 88</td>
</tr>
<tr>
<td>7</td>
<td>Your HF Transmitter</td>
<td>89 - 102</td>
</tr>
<tr>
<td>8</td>
<td>Your Receiver</td>
<td>103 - 108</td>
</tr>
<tr>
<td></td>
<td>Oscillators and Components</td>
<td>109 - 119</td>
</tr>
<tr>
<td>9</td>
<td>Electrical Principles</td>
<td>121 - 133</td>
</tr>
<tr>
<td></td>
<td>Circuits</td>
<td>134 - 147</td>
</tr>
<tr>
<td>10</td>
<td>Good Grounding Procedures</td>
<td>148 - 151</td>
</tr>
<tr>
<td></td>
<td>High Frequency Antennas</td>
<td>152 - 169</td>
</tr>
<tr>
<td></td>
<td>Coax Cable</td>
<td>170 - 177</td>
</tr>
<tr>
<td>11</td>
<td>RF and Electrical Safety</td>
<td>178 - 186</td>
</tr>
<tr>
<td>12</td>
<td>Exam Session and Graduation</td>
<td></td>
</tr>
</tbody>
</table>
**DO SOME MORSE CODE**

On February 23, 2011, the FCC eliminated the requirement of passing a Morse code test. And now that classroom testing for the CW test is no longer required by the Federal Communications Commission, guess what? YOUR STUDENTS WILL WANT TO LEARN MORSE CODE! They no longer fear the dreaded Morse code tests at the end of the class sessions, so now their minds are wide open to learn Morse code. Give them code practice! This will make them better hams when they get on the HF airwaves.

In each class session, begin teaching Morse code on a straight key or electronic keyer. This introduces your students to the new sounds of dits and dahs and they will actually enjoy code practice in class. Follow the exact progression of learning Morse code characters, found on page 194 - 201, and on my exclusive CW audio CDs and from W5YI.

You might even generate a simple fun Morse code “Graduation Test” at the end of the General Class course:

```
VVV VVV THIS IS AN AMATEUR RADIO MORSE CODE TEST. IF YOU CAN COPY WHAT I AM SENDING, STAND UP AND TAKE A BOW.
```

When you do the code in your classroom, you should try to use multiple speakers throughout the room to minimize echoes. Use an electronic key, and key-in the code yourself. This allows you to make dramatic pauses between hard letters, words, sentences, and allows you to re-enter any code character that you see your students might be missing. *Don’t just play code cassettes or a computer code program. Do it live yourself for maximum effect.*

I also recommend you do some code over 40 meters, asking the other station to please QRS so that your students may write down what the other station is sending. This is another great way to keep excitement at its peak in your classroom.
DEMOS & PROPS / SHOW & TELL
WILL MAKE YOUR CLASSROOM LIVELY

You know that a picture is worth a thousand words – and a hands-on demonstration is a lot more fun and memorable than a straight “talking heads” lecture. Now let’s take a look and see what graphics, demos, and props you can build into each of my 18 topic areas. Here’s a host of “show and tell” ideas – keyed to the topic areas in my book – to help make your classroom session lively, memorable, and fun!

When you start to figure out your classroom demonstrations, review the Forrest Mims book Getting Started in Electronics. It is full of fun experiments that will help you get your points across, especially when it comes to helping your students understand the fundamentals of electricity, electronics, and how components work.

Your Passing CSCE (pages 23 - 25)
♦ Show a sample copy of a CSCE
♦ NCVEC form 605
♦ Old Callbook
♦ Copy of Ham license
♦ FCC Rulebook, CFR 74, Part 97 (available in quantity discounts from the W5YI Group)

Your New General Bands (pages 26 - 33)
♦ Review color band chart (usually available free from W5YI Group Instructor Program when ordering books)
♦ Listen to each band with LIVE equipment
♦ Make contact on 1 or 2 bands
♦ Identify wavelength when looking at radio frequency
♦ Identify Frequency at a specific wavelength – use “Slinky™” to show relationship between frequency and wavelength
♦ Discuss band plans on page 33

FCC Rules (pages 34 - 41)
♦ Show an active Log book and a computer Log of the World
♦ Show an OO postcard
♦ Quick demo of Fox-hunting
♦ Talk about satellite and space shuttle programs
♦ Discuss third party rules
♦ Review regulations for operating in a foreign country
**Be a VE!** *(pages 42 - 43)*
- Show VE credentials
- Show a properly filled-out CSCE
- Explain penalties for deliberate VE misconduct

**Voice Operation** *(pages 44 - 53)*
- Work your live classroom equipment to another station on 20 meters.
  *(Illustrate listening before transmit.)*
- Give signal reports.
- Have students say their name and then spell their name phonetically.
- Have student read an HF RST report.
- Have the class listen to an incoming HF signal.
- Illustrate how to place a general call on HF 75 metes.
- Illustrate how to place a general call on 10 meters SSB with the CQ.
- Pass around a list of ham abbreviations.

**CW Lives!** *(pages 54 - 61)*
- Each class session should have a live Morse code oscillator – and both straight key as well as electronic key. Refer to page 191-198 in my book showing Morse code.
- Teach some simple CW characters and words: AT, EAT, SOS, TEAM, ANTENNA, and TEST are good ones to start with.
- Demonstrate CW on 10 meters Technician band.

**Digital Operating** *(pages 62 - 70)*
- Bring in your lap-top computer with an HF radio on an outside antenna. Tie it in with a TNC (terminal node controller), my favorite is the SCS PTC2 Pro. Dial the radio around for incoming computer signals, watch the TNC decode it, and then watch the faces on your students!
- Illustrate simple data using CW and a flashing light.
- Tune around the band, best on 20 meters, listening to RTTY, AMTOR, PACTOR II, PSK-31, CLOVER, and any other digital mode including CW.
- Log onto APRS and show them live positions coming up on local maps.
- Check into a repeater with IRLP and place a call to a ham in a different portion of the world. Be sure to set this up ahead of time to offer a no-problem, no-surprise connection. In other words, stage your operating well ahead of time to insure everything goes smoothly between your computer, your students, and the outside world of radio!
- Play audio recordings of actual space contacts – including satellite, space shuttle, and International Space Station *(these are all on my audio course.)*
- Show QSL cards.
- Play some of the sound tracks from the audio CD included with the book.
**In An Emergency (pages 71 - 73)**
- Play excerpt from my audio course of a station calling for help.
- Play excerpt of earthquake and hurricane emergency traffic.
- Give examples of non-emergency but priority calls on HF.
- Hand around rechargeable batteries and alkalines – describe battery life, battery natural decay for rechargeables, and small AA cell battery rechargers.
- Show a RACES patch.
- Conduct third-party traffic locally with student.
- Decline money payment.
- Review third-party list, Page 205.

**Skywave Excitement (pages 74 - 88)**
- Start out by tossing 10 or 15 foam fuzz balls around the room, illustrating radio waves traveling through the air.
- Describe the velocity of radio waves, and then describe frequency and wavelength.
- Use a plastic slinky to better illustrate frequency and wavelength. Have a student pull it apart for longer wavelength, and have another student measure frequency by how many oscillations in one second.
- Use an adjustable tone generator to illustrate audio and radio frequencies.
- Use a guitar or other stringed instrument to illustrate frequencies.
- Review manufacturer color frequency privileges charts
  (Available free from W5YI Group Instructor Program when ordering books).
- Listen to signals on different bands.
- Show HF, VHF, UHF on the board.
- Make contacts on 40 or 20 meters.
- Have students identify wavelength when looking at a radio’s frequency.
- Bring in a radio-controlled model boat or car. Show them how the model turns and maneuvers via radio control. You don’t necessarily need to be on 6 meters to illustrate radio control, but have a separate receiver to tune into the actual sounds that the radio-control transmitter may send to the model airplane or boat.
- Bring out those soft fuzz balls and start throwing them around the room. This will get everyone’s attention to what radio waves may be doing all around them.
- Bounce the fuzz ball off the ceiling to illustrate skywaves, and roll it on the floor to show groundwaves and ground-wave obstructions.
- Bring out a prism to illustrate refraction of wavelengths as seen in different colors of sunlight.
- Tune into WWV at 18 minutes past the hour for solar report.
- Tune into skywave comms on HF.
- Tune into groundwave signals on HF and 2 meters.
- Reverse binoculars held over a white sheet to show sunspots.
- Illustrate minimum ionospheric activity just like minimum temperatures just before dawn as you wear a very heavy coat.
- Tune into HF CW to illustrate what a beacon may sound like.
- Look for beacons on 10 meters and 15 meters.
Your HF Transmitter (pages 89 - 102)
- Bring in and turn on, older tube radio
- Show off new transistorized HF radio
- Open up radio and show various transmitter stages
- Transmit into dummy load and show modulation on an oscilloscope
- Demonstrate oscilloscope patterns
- Show a small tube RF amplifier
- Show individual crystal elements
- Show tube set loading into an antenna
- Demonstrate dummy load and watt meters
- Talk about dangers around high voltage amplifiers

Your Receiver (page 103 - 108)
- Open up HF tube radio and show receiver section
- Show receiver in a solid state HF radio
- Demonstrate digital signal processing
- Demonstrate different filters
- Demonstrate notch filter
- Show how to read an “S” meter
- Demonstrate the use of a signal tracer

Oscillators and Components (pages 109 - 119)
- Demonstrate oscillators with a pendulum
- Show off vacuum tubes
- Demonstrate transistorized transceivers
- Do voltage checks on transistors
- Demonstrate light emitting diodes
- Show an LCD display, and let it bake in the sunlight
- Show off a binary counter chip
- Bring in a programmable scanner to demonstrate memory

Electrical Principles (pages 120 - 133)
This is the section of the course where the Mims book will be very helpful to you!
- Colored water and clear tubing makes for some great safe demos. The water is voltage; squeezing the bulb creates current; and a kink in the clear tubing illustrates resistance. Drive a little paddle wheel to show power. Here’s an illustration from page 14 of Mims’s book showing how you might build a model to demonstrate electricity fundamentals.
- A volt meter and an ammeter.
- Describe current and light up a 12-volt light bulb.

Courtesy of Forrest M. Mims, III
Show off an inverter, and then show off a power supply.
Show off / illustrate a multimeter – both digital and d’Arsonval (needle).
Show fuses good and bad, and meter them in the resistance mode to check.
Spark a fuse to blow it on purpose (Mims book, pages 24-31)
Work with several needle-type multimeters (Mims book, page 26)
Pass around DC power supply filters.
Show current flow with a 12-volt bulb and a diode in series, passing and blocking current.
Talk about the dangers of electrocution with current flowing from your fingers and out through your feet when doing the laundry in the garage (Mims book, page 19).
Work the Ohm’s Law formulas on the board, and illustrate with a simple 12-volt DC light bulb.
Pass around various resistors, and talk about resistor color code although it’s not needed for the exam (Mims book, page 28-31). Demo the effect of a fixed resistor and 12-volt lightbulb.
Plenty of little batteries (Here’s an illustration from page 16 in Getting Started in Electronics for a lemon battery project that’ll get kids really excited!)
Pass around schematic diagrams of equipment and have them identify components.
Demo a variable resistor on the 12-volt light bulb with current flowing through both.
Illustrate capacitors and spark a big electrolytic carefully. See Mims book, page 32, for how to make a capacitor with aluminum foil and waxed paper.
Show off a variable capacitor.
Show off coils. (Mims book, pages 38 – 39.)
Demonstrate the power of a coil by dropping a rare earth magnet ball down the end of an aluminum tube, only to see the ball slowly float down as Lenz Law impedes the physical flow of the ball’s energy.
Pass around transformers. (Mims book, pages 40-41.)
Pass around diodes and illustrate diodes.
Pass around transistors and large-scale integrated chips.
Pass around switches.
Have plenty of goodies to pass around. Instead of just talking about a component, show them what it looks like and feels by passing them around. When everybody has one component, go around the room and do a spot quiz to see if they can identify what that component is, and what it does!
Buy Forrest Mims’s book Getting Started in Electronics! It’s a gold mine of ideas to demonstrate and teach electricity and electronics!!
Circuits (pages 134 - 147)
♦ Teach students how to read the schematic on page 129
♦ Pass around resistors, capacitors, switches, and transformer
♦ Teach resistor color code
♦ Teach to solve resistors in series and parallel
♦ Teach to solve capacitors in series and parallel
♦ Teach to solve inductors in series and parallel
♦ Demonstrate reactance with a permanent magnet down an aluminum tube
♦ Show off torroidal inductor
♦ Demonstrate SAFELY a live step up and step down transformer with a volt meter
♦ Show inside of radio and placement of coils

Good Grounds; HF Antennas; and Coax Cable (pages 148 - 177)
♦ Start by making a simple dipole for 10 meters.
♦ Have students build their own different dipole on different bands.
♦ Have students build a quarterwave ground plane for 10 meters using soda cans as a vertical, and then use an MFJ SWR analyzer to the results after the coax has been soldered.
♦ Use a soft, inflatable ball to demonstrate antenna radiation patterns.
♦ Bring in a guitar or ukulele to demonstrate resonance.
♦ Bring in parts of a multi-band vertical to demonstrate traps and capacity hats.
♦ Use a flood lamp to demonstrate directional antennas.
♦ Use a light bulb to demonstrate omni directional antennas.
♦ Bring in old TV antenna and demonstrate director, reflector, and driven element - CAUTION: PUT RUBBER BALL ON ALL ELEMENT ENDS TO PROTECT EVERYONE AROUND.
♦ Show off an automatic antenna coupler in action.
♦ Demonstrate a center-loaded, high-Q, mobile antenna system.
♦ Pass around a balun.
♦ Show a corroded antenna connection.
♦ Discuss and demonstrate safe soldering techniques (Mims book, page 98)
♦ Demonstrate directivity of a halfwave dipole.
♦ Show antenna modeling on your computer.
♦ Bring in a small cubical quad antenna.
♦ Illustrate polarization with wire and an automatic HF antenna tuner.
♦ Talk about the little rubber duck antenna.
♦ Show off various sizes of coaxial cable.
♦ Use a watt meter to illustrate coax cable losses.
♦ Show off parallel conductor and twin-lead.
♦ Illustrate standing waves with a rope.

Courtesy of Forrest M. Mims, III
♦ Show a standing wave ratio meter.
♦ Determine SWR on a student-built HF antenna.
♦ Show off hard hat and safety glasses and a climbing belt.
♦ Demonstrate grounding techniques and ground foil.
♦ Demonstrate green wire on a 3-blade plug.
♦ Show off component hit by lightning.
♦ Walk outside and spot high-voltage, unprotected power lines.
♦ Show off old unsafe leather climbing belt.
♦ Show off old rusted turn buckles.
♦ Show off one way to launch a non-conductive line over a tree.

**RF and Electrical Safety (pages 178 - 186)**

♦ Turn on a flood lamp or auto headlamp and have a student come up and feel the warmth. If they touch it, they will get burned. This illustrates a basic principle of radiation.
♦ Talk about the handheld and show keeping the antenna away from your head.
♦ Go outside and examine a mobile vehicle installation for safe placement of the HF antenna.
♦ Talk about microwave ovens and what they do to food on the inside.
♦ Use the microwave oven to illustrate duty cycle.
♦ Work the charts in the book, going over controlled and uncontrolled environments, pages 201 – 203.
♦ Give them questions on the charts in the book that are different than the actual book questions.
♦ Discuss safety when working with electricity.
♦ Reinforce all test questions dealing with personal operator safety around transmitting antennas.

*Remember – kids (and adults, too) love the excitement of live ham radio demos! They are the key ingredient for a successful, memorable ham radio course!!*
Resources

So, where do we get all of these materials to put on a class and do these different demos? Chances are, you probably have a bin full of “stuff” that would make great demo items. If you invite your ham friends to help with the class, you will find each may have a specialized area of operation, and they would love to bring that particular demo into the classroom. You can’t do it all yourself – get your ham pals to bring in their specialty gear and talk about their operating modes!

**GORDON WEST BOOKS, AUDIO CDs, & W5YI SOFTWARE PACKAGES AT AN INSTRUCTOR DISCOUNT:**

The W5YI Group (800-669-9594, or www.w5yi.org) distributes all of the Gordon West amateur radio study materials for the Technician, General, and Extra class licenses. They offer a special Instructor Discount Program to ham radio instructors registered with W5YI. Here’s a summary of the products:

*Technician Class, General Class, and Extra Class* study manuals. Each book contains the exact questions and answers used to make up the exams, plus explanations of the correct answers. The books also contain a great deal of additional information on ham radio, including frequency privileges, list of VECs, and much, much more.

*Educational Book & Software Packages.* W5YI also has each book packaged with Windows® software that allows students to study the Q & A at their PC and take practice exams. The software scores their exams showing where they are weak and need more study. Gordo’s fun explanations and keywords appear when a student answers incorrectly. Each package includes a free copy of W5YI’s FCC Part 97 rule booklet.

*Audio Theory CDs* for each license class recorded by Gordon West. Each set of CDs (4 each for Technician and General, and 6 for Extra) discusses the theory covered in each FCC exam element. They are a great way to get the students to pre-study and listen in on the excitement of ham radio for their upcoming class. All of the theory CDs contain live sounds of radio, plenty of sound effects, and Gordo’s humor to keep students playing the CDs over and over again.

*Code CDs.* Teaching the code? If you’re planning to teach Morse code, Gordo has an in-depth set of 6 audio CDs that students love because of the humor that is on them – they make learning the code *fun*. He also has a 2 CD code teacher. As an instructor, you may also use these cassettes to play over the airwaves, especially on the 2-meter band. All of the code characters are sent Farnsworth method at 15 wpm character rate, spaced to 5 wpm word rate. Refer to Chapter 5 of *General Class*, “Learning Morse Code,” pages 194 to 201, on the progression of letters, lesson plans, and steps to make code learning FUN.
EXOTIC DEMO TOOLS & PROPS

If you are not into building your own plasma tube, or your own Tesla coil, a commercial educator/experimenter company called Information Unlimited Amazing Devices (800-221-1705, or www.amazing1.com) has you covered big time! They have assembled systems or kits for Tesla’s, levitation, induction and conduction, spark gap, neon tube conductor analyzers, and a host of other “eyeshocking” devices that are relatively safe around your students, yet will have everyone coming back for a second look. One device, called the phaser tube, allows me to show conductivity by having students joining hands in series and watching the neon tube begin to glow further and further up as better contact is made. Another good prop is the Tesla coil, but keep in mind this device has plenty of high voltage around it. Always take your high-voltage demos off-line when teaching a class for kids – they are indeed curious!

Free With Each Book Purchase:

- FREQUENCY CHARTS, WALL MAPS, GRADUATION CERTIFICATES, DISCOUNT COUPONS & MORE...

Order your books through The W5YI Ham Instructor Program and they will include as much material that they may have on hand.

To order the Gordon West General Class book, go to

www.w5yi.org or call 1-800-669-9594

To register as an instructor or to have your class posted on our website, go to:

www.haminstructor.com

In addition, here is a listing of various manufactures, dealers, and others that may supply you with materials that contain excellent illustrations and simplified technical explanations to help with your demonstrations.

- Aluma Towers lightweight tower catalogs www.alumatower.com
- Amateur Electronic Supply full ham catalog www.aesham.com
- CQ Communications promotional copies of CQ www.cq-amateur-radio.com
- Gap Antenna Products catalog on vertical antennas www.gapantenna.com
- Ham Radio Outlet full ham catalog www.hamradio.com
- ICOM America band charts www.iconamerica.com
- Kenwood USA frequency charts, maps, catalogs www.kenwood.net
- LDG Electronics automatic antenna tuner charts www.ldgelectronics.com
- MFJ Enterprises catalogs on all sorts of accessories www.mfjenterprises.com
- QSLs by W4MPY sample QSL cards www.w4mpy.com
- QSLs by Star Printing sample QSL cards www.qth.com/wx9x
- Radio Works antenna catalogs www.radioworks.com
- SGC, Inc. tuner and radio catalogs www.sgcworld.com
- Universal Radio 100-page full ham catalog www.universal-radio.com
- W5YI Group VEC info / License prep materials www.w5yi.org
- W & W Associates battery catalogs www.wwassociates.com
- Yaesu Electronics frequency charts, world maps www.yaesu.com
We’ll be happy to supply you with band plan charts, grid square maps, manufacturer’s discount coupons, and more for each of your ham class students when you order your student’s study manuals from The W5YI Group.

A special word of thanks to Yaesu, Kenwood, and Icom for their continuous free classroom materials with our books to instructors in support of the Gordon West / W5YI Ham Instructor Program!

When your students graduate, I want to know about it! I have a very nice certificate suitable for framing (below) – plus free ham operating materials from equipment manufacturers. All I need is a large, self-addressed envelope with 12 first-class stamps inside for each student to cover postage and handling, and I’ll send one their way. They can write me at:

Gordon West Radio School
2414 College Drive
Costa Mesa, CA 92626
AN INVITATION TO SIT-IN & SEE FOR YOURSELF

Now that we are at the end of this Instructor’s Guide for you, the instructor, on how to teach an upgrade ham radio class, allow me to invite you to sit in on any one of my ham classes throughout the country – or any of the seminars that I present at hamfests or club get-togethers. Feel free to adopt any of the demos that I do, and please share with me any demonstrations that you have developed so I might adopt them myself and pass them on to others.

Also, beginning on the next page, is my Pre-Study Q&A for the 2011-15 General class. Feel free to make copies of it for your students. You can use it for the weekend seminar format, or you can adapt it as homework for a weeknight course. If you can get your students to pre-study your classes will be much more fun with more time for demos, and you student pass rate will soar!

All of my theory books, audio theory CDs, code CDs, and the W5YI computer programs are available at a discount to you. We offer you these discounts because you are our most valuable resource for the growth of Amateur Radio, the Elmer/instructor. Get all of my materials at a discount, and use any small amount of profit towards continuous improvement of your presentations and classes. If you are teaching for a club, the club may want to purchase the materials and offer them to the students as a group discount. Or it may want to use the profits to help pay the cost of conducting the classes, or to pay the classroom or testing facility fee.

If you have your own ideas on what should be in the three amateur radio question pools, feel free to send me your revised Q & A’s. Become an active contributor to future question pools that are revised every 4 years.

Work closely with your local amateur radio dealers. They can assist by providing space for your class announcements, as well as providing demo gear during your upcoming course. Chances are, when you start turning brand new licensed students over to them, they’ll want to provide a lot more for you in appreciation of what you are doing to help ham radio grow.

Remember – teaching ham class is supposed to be fun for you, too! The more excitement you generate, the more fun for everyone!!
Finally, don’t hesitate to call me personally and share with me your comments on what we all may do to better our ham radio presentation to students throughout the country. I can be reached Monday through Thursday, 10 am to 4 pm Pacific time, by calling me at 714-549-5000. Say hi to my wife, Suzy, N6GLF, too. Or write me a note at:

Gordon West Radio School
2414 College Drive
Costa Mesa, CA  92626

or you may e-mail me at: WB6NOA@ARRL.NET

So what are you waiting for? Start looking over my General Class book, play the CDs from my audio course, be sure to listen to the “On The Air” CD included in my book, create your home study pre-course workbook, and let’s get started with your upcoming ham radio class. I’m right here with you!

73
Gordon West
WB6NOA

The natural curiosity of kids makes teaching them ham radio particular fun. Adults. RVers. Boaters. Hunters. There’s something for everyone in our Amateur Radio hobby. And the rewards for you – the instructor – are tremendous as you help our hobby grow!
Welcome to your weekend class pre-study homework. Your upcoming weekend class is absolutely NOT a cram session, followed by the test. Rather your weekend course will take your textbook questions and answers and relate them to the real world of ham radio operating.

This pre-study material comes straight out of the Gordon West General Class book for the 2011 through 2015 Element 3 question pool. The fill-in-the-blank questions in this pre-study guide follow the exact order of the book. We even give you page numbers to quickly spot the correct answer!

In addition to the Gordon West General Class book, this pre-study material is covered in the exclusive audio CD course. The CD audio course is a fun way to hear the radio sounds behind some of these questions.

This pre-study homework is fill-in-the blank. Your actual Element 3 written examination will be a multiple choice exam – all the easier.

This fill-in-the blank homework also parallels the computer home study course. Taking sample exams on the computer is fun, educational, and a double-check that you will do well on the upcoming written examination.

Begin reading over your General Class book, and start filling in the home study answers. The page numbers will help! Be sure to bring your completed home study to the first class session.

To order the Gordon West General Class book, go to www.w5yi.org or call 1-800-669-9594
GENERAL CLASS PRIVILEGES (pages 1 - 8)
1. What sideband on 160 m, 75 m, and 40 m, upper or lower? ________________________________
2. General voice limits on 75 m? ________________________________ __________________________
3. How much power output on 60 m? ________________________________ __________________________
4. What emission on 30 m? ________________________________ __________________________
5. What sideband on 20 – 10 m? Upper or lower? ________________________________ __________________________
6. General voice band limits on 20 m? ________________________________ __________________________
7. General voice band limits on 15 m? ________________________________ __________________________
8. General voice limits on 10 m? ________________________________ __________________________
9. On which 3 bands did we recently gain additional voice spectrum? ________________________________ __________________________

A LITTLE HAM HISTORY (pages 9 - 16)
1. How old is the amateur radio service? ________________________________ __________________________
2. Approximately how many licensed USA hams? ________________________________ __________________________
3. In 1979, what requirement was eliminated for operation above 30 MHz? ________________________________ __________________________
4. On Feb. 23, 2011, what requirements were eliminated for high frequency licensing? ________________________________ __________________________
5. When did VE testing begin? ________________________________ __________________________
6. Which test element is Element 3? ________________________________ __________________________
7. Which test element is Element 4? ________________________________ __________________________
8. Must you learn the code to pass a test? ________________________________ __________________________
9. Why should all hams know Morse code? ________________________________ __________________________

GETTING READY FOR THE EXAM (page 17 - 22)
1. How many questions on your upcoming test? ________________________________ __________________________
2. How many questions in the entire Element 3 pool? ________________________________ __________________________
3. May examiners CHANGE the wording of the test? ________________________________ __________________________
4. What TOPIC covers question G1AO4? ________________________________ __________________________
5. How can the blue key words help? ________________________________ __________________________
6. After my rearrangement, how many topic areas are there? ________________________________ __________________________
7. How many questions can I miss and still pass? ________________________________ __________________________

YOUR PASSING CSCE (page 23 - 25)
1. What does CSCE stand for? ________________________________ __________________________
2. Append these two letters after my Technician Class call sign when I pass General: ________________________________ __________________________
3. What language must I use to identify my station? ________________________________ __________________________
YOUR NEW GENERAL BANDS (pages 26 – 33)

1. What formulas to convert frequency to wavelength, and wavelength to frequency? 

2. Where did Gordo goof on question G1A01 in the blue key words? (hint – read the explanation carefully, and line out 15) 

3. General voice privileges on 15 meters? 

4. General voice privileges on 40 meters? 

5. How much power output ERP on 60 meters? 

6. General voice privileges on 75 meters? 

7. Voluntary guideline for band usage? 

8. Where on 10 meters can we find beacons? (p. 33) 

FCC RULES (pages 34 – 41)

1. What part of the Rules covers the amateur radio service? 

2. What items would you put in your station log? 

3. Who REALLY helps enforce the rules? 

4. What is prohibited in ham radio rules? 

5. What do we call a person who talks over your ham radio, with no license, with you in charge? 

6. Do we have a third party agreement with Japan? 

7. May I travel to Italy and operate with a CEPT? 

BE A VE! (pages 42 – 43)

1. How many VEs to conduct an exam? 

2. Three General Class VE’s may conduct which test? 

3. Who accredits individual volunteer examiners? 

4. What age limit to become a VE?
VOICE OPERATION (pages 44 – 53)

1. What does 73 mean? ________________________________________________
2. What does QSL stand for? _____________________________________________
3. What would you say to break into an on-going conversation? ________________
4. What does CQ DX mean? ______________________________________________
5. How many kilohertz separation between SSB signals? ______________________
6. This circuit triggers your radio to transmit when you talk? __________________
7. No FM phone emission below what frequency? ______________________________
8. On what bands do we use lower SSB? _____________________________________
9. On what bands do we use upper sideband? _________________________________
10. What band is channelized for only 5 channels? ____________________________

CW LIVES! (pages 54 – 61)

1. What does QRS mean in Morse code? _________________________________
2. What does QSL stand for? _________________________________
3. Will you be tested for Morse code in class? ______________________________
4. What is the big benefit in knowing code? ________________________________

DIGITAL OPERATING (pages 62 - 70)

1. Where might you find 20 meter PSK 31 transmissions? ______________________
2. What does RTTY stand for? _________________________________
3. How many data bits in a single PSK 31 character? _________________________
4. Greater digital speeds require __________________________ frequency shifts?
5. For digital operation, your ham set needs to be tied into what? _______________
6. What is the name of sending photographs over high frequency? ______________

IN AN EMERGENCY (pages 71 – 73)

1. What emission mode is authorized for emergency communications? ______________
2. First thing to find out when answering a distress call? _________________________
3. What does RACES stand for? _____________________________________________
SKYWAVE EXCITEMENT (pages 74 – 88)

1. Which furthest ionospheric layer refracts radio waves? ______________________________
2. Which ionospheric layer absorbs radio waves? ________________________________
3. What does MUF stand for? ________________________________
4. Waves that hug the surface of the earth are called? ______________________________
5. HF scatter signals usually sound? ________________________________
6. Area too far for ground waves, yet too close for sky waves? __________________________
7. How long is a sun spot cycle? __________________________
8. HF sky wave conditions usually happen every ____________ days?
9. Which index tells short term stability of the Earth’s magnetic field? ________________
10. What might you SEE during periods of high geomagnetic activity? ________________
11. Charged particles take ________________ hours to reach the Earth?
12. Best band anytime for long range propagation? ________________________________

YOUR HF TRANSMITTER (pages 89 – 102)

1. What is the name of the process changing your voice to an intelligible radio signal? ______________
2. What circuit in a transmitter combines signals? ___ ______________________________________
3. What does a speech processor accomplish? __________ ____________________________________
4. What does ALC stand for? __________________________ _________________________________
5. Should you adjust your microphone gain for flat topping? ___________________________________
6. What test for linearity? __________________________ ____________________________________
7. What emission from a reactance modulator? _________ ____________________________________
8. Peak power to average power, multiply by this? ________________________________
9. Average power to peak power, multiply by this? ________________________________
10. Double or nothing – a two times gain = ____________ _ db?
11. Are Class C amplifiers efficient? ________________________________
12. Are Class A amplifiers linear? ________________________________
13. Do this with your transmitter to minimize positive feedback? ______________________________
YOUR RECEIVER  (pages 103 – 108)

1. Which receiver stage processes signals from the RF amplifier and local oscillator? _______________
2. What is a term for mixing 2 RF signals? ______________________________________________________________________
3. What does DSP stand for? ______________________________________________________________________
4. Which filter will automatically notch a tone? ______________________________________________________________________
5. What type of meter measures signal strength? ______________________________________________________________________

OSCILLATORS & COMPONENTS  (pages 109 - 119)

1. All oscillators have this? ______________________________________________________________________
2. What is the junction threshold voltage of a Germanium diode? ______________________________________________________________________
3. What type of display requires back lighting? ______________________________________________________________________
4. What does LED stand for? ______________________________________________________________________
5. What does a shift register do? ______________________________________________________________________
6. What does ROM stand for? ______________________________________________________________________

ELECTRICAL PRINCIPLES  (pages 120 – 133)

1. Draw Ohm’s Law Circle

2. Ohm’s Law circle for power? ______________________________________________________________________
3. A half-wave rectifier works which portion of the cycle? ______________________________________________________________________
4. A full-wave rectifier works which portion of a cycle? ______________________________________________________________________
5. Which components are in a power-supply network? ______________________________________________________________________
6. Name a rechargeable battery? ______________________________________________________________________
7. How do we process sunlight into electricity? ______________________________________________________________________
8. Can you run your new HF radio using your automobile cigarette lighter plug? ______________

Gordon West’s Instructor’s Guide for 2011-15 General Class - Page 33
CIRCUITS (pages 134 - 147)

1. In the schematic G7-1: What is #1? ____________________________
2. What is #2? ____________________________
3. What is #12? ____________________________
4. What is #7? ____________________________
5. What is #14? ____________________________
6. What is #8? ____________________________
7. How do resistors combine in series? ____________________________
8. How do capacitors combine in parallel? ____________________________
9. Reactance is the opposition to the flow of? ____________________________
10. What is the unit of impedance? ____________________________
11. What does a ferrite core do to a torroidal inductor? ____________________________
12. A transformer’s primary is conducted to? ____________________________

GOOD GROUNDS and HF ANTENNAS (pages 148 - 169)

1. What is one reason for good grounding of your equipment? ____________________________
2. Do we ground with wide foil strap or big round wires? ____________________________
3. What creates the musical whine in your automobile ham set? ____________________________
4. Formula for constructing a half wave dipole, end to end, in feet? ____________________________
5. How long is a 1/4 – wave vertical antenna for 20 meters? ____________________________
6. Which antenna concentrates energy in one general direction? ____________________________
7. What is the common match used with a Yagi antenna? ____________________________
8. What might an antenna trap do? ____________________________
9. What antenna type is constructed of square ¼ wave elements? ____________________________
10. What is the advantage of a log periodic antenna? ____________________________
11. Why is impedance matching important on mobile HF whips? ____________________________
12. Which meter might indicate radiation patterns of an antenna? ____________________________

COAX CABLE (pages 170 - 177)

1. What is the usual impedance of ham coax? ____________________________
2. What is the impedance of flat ribbon twin lead? ____________________________
3. What might be a poor SWR reading? ____________________________
4. Big benefit of a type N connector? ____________________________
5. Which antenna is Suzy holding on page 71? ____________________________
RF and ELECTRICAL SAFETY (pages 178 – 186)

1. Wear this when climbing a tower? _____________________________________________
2. Are indoor antennas safe? ____________________________________________________
3. What does MPE stand for? _____________________________________________________
4. What might RF energy do to your eyes? __________________________________________
5. Which circuit purposely disconnects AC line power with a fault detected? ______________
6. How many amps for #14 wiring? _______________________________________________
7. How many amps for #12 gauge wiring? __________________________________________
8. Danger of lead-tin solder? _____________________________________________________
9. Danger of a generator near your ham shack? _______________________________________

CONGRATULATIONS ON COMPLETING YOUR PRESTUDY ASSIGNMENT!

If you were able to complete most of this homework, you’ll do fine on your up-coming General class exam. Continue to review the book before class. You also can take practice exams on your computer using our W5YI software (available from The W5YI Group – 800-669-9594 or on-line at www.w5yi.org).

When you pass the examination, be sure to send for your FREE graduation certificate and band charts. Page 193 gives you all the details.

I look forward to seeing or hearing you on the airwaves soon!

Gordon West
WB6NOA