

Instructor Syllabus

iNet+ Certification

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Instructor Syllabus: iNet+ Certification

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Introduction

The iNet+ course components

The iNet+ course includes many of the tools you need to meet the needs of a wide range of students. Some of those resources include:

- ◆ Textbook
- ◆ Slide show
- ◆ Quizzes
- ◆ Games and worksheets
- ◆ Labs and group activities (You might want students to keep a journal of their lab activities throughout the course)
- ◆ Summary page at the end of each lesson
- ◆ Review questions at the end of each lesson

In addition, this Instructor Syllabus makes suggestions on ways to involve students, use the materials, and present the course to students.

Instructor's Introduction

Instructor Syllabus contents

This Instructor Syllabus includes the following:

- ◆ **Introduction**, which includes an explanation of the iNet+ Certification program.
- ◆ **Course Outline for *iNet+ Certification***, which lists the required textbook and gives a block-by-block breakdown of the course, including specific tips, analogies, supplemental material, and comments for instructors. Icons indicate when instructors should run a slide show; refer students to the CD-ROM or the Internet; or have students perform an activity. Icons also indicate applicable worksheets, games, and quizzes.

These icons are:



CD-ROM



slide show



Internet



student game



lab/activity



quiz



summary



textbook

- ◆ **Review questions—Answer Key**, which provides the answers to the review questions for each lesson.
- ◆ **Student exercises and answers**, including crosswords and word games

Instructor's Introduction

iNet+ Certification program

The iNet+ Certification program provides the best method for students to prove their command of baseline Internet knowledge in preparation for Internet-related careers.

iNet+ Certification is recognized worldwide as a standard of competency in Internet-related technologies. Certification indicates that students have the level of understanding necessary to:

- ◆ Use first-level troubleshooting tools and basic Internet services
- ◆ Install, configure, and perform basic troubleshooting for client Internet access
- ◆ Maintain and monitor multi-user backups
- ◆ Perform routine maintenance on client-specific applications
- ◆ Install and configure client security add-ons, encryption software, and personal digital identification
- ◆ Scan audit logs for suspicious activity
- ◆ Monitor security
- ◆ Perform basic pre-deployment testing
- ◆ Develop simple Web scripts and basic HTML authoring
- ◆ Test and troubleshoot database connectivity and perform basic queries
- ◆ Test non-production/pre-deployment e-commerce servers for functionality and performance
- ◆ Create logic diagrams of Internet components from the client to the Internet
- ◆ Install, configure, and perform basic troubleshooting of network cards, cable modems, and plug-in cabling
- ◆ Assist in the administration of local Internet sites and access

Instructor's Introduction

Many companies consider certification of high value in evaluating potential employees.

The Computing Technology Industry Association (CompTIA), made up of more than 45 organizations that have defined the skills needed by competent Internet specialists, administers the iNet+ Certification program. The exams measure those skills.

Instructor's Introduction

Presenting the iNet+ course

"Tell me and I forget,
teach me and I remember,
involve me and I learn."

– Benjamin Franklin

iNet+ Certification is the textbook for the JES & Co. course designed to help prepare students for the iNet+ exam.

This course prepares students for the iNet+ exam; more importantly, students completing this course should have the baseline knowledge for many Internet-related careers, including Internet Systems Administrators, Internet Security Specialists, Internet Application Developers, Internet Database Specialists, Internet e-Commerce Specialists, Internet Network Specialists, and Internet Site Designers.

As in any classroom for any subject, you must provide materials in a variety of ways to ensure that the widest range of students can achieve these goals at the completion of the course. The JES & Co. iNet+ course includes various components designed to address students of all learning styles. This introduction reviews the various learning styles, examines the components of the JES & Co. course, and explains how you can use the components together to reach all the students in your classroom.

What are learning styles?

Learning styles are the way individuals perceive and process information. By addressing these various learning styles in the classroom, you are better able to meet the needs of all students.

There are many different schools of thought on learning styles. The following chart summarizes the types of learners based on the popular Felder-Silverman Model. The model consists of five pairs, each of which represents a range of how students perceive and process information. Everyone learns through a combination of the five pairs. Each individual's strengths and weaknesses differ, depending on where he or she falls within each range.

Instructor's Introduction

Basic Types of Learners	
Sensing Concrete, practical, fact-oriented	Intuitive Conceptual, innovative, theoretical
Visual Visual representations, diagrams, flow charts	Verbal Written or spoken explanations
Inductive Presentations from specific to general	Deductive Presentations from general to specific
Active Try things, work with others	Reflective Think things through, work alone
Global Holistic, systems thinkers, learn in large leaps	Sequential Linear, orderly, learn in small steps



Traditionally, technology education has focused on intuitive, verbal, deductive, reflective, and sequential learners. Those learners fitting these categories may do well and succeed in the courses, but those toward the other side of each range tend to have difficulty in the class and may not learn effectively. Your challenge, as the instructor, is to meet the needs of all students in the classroom by offering a combination of materials, presenting those materials in different ways, and involving students in a variety of activities.

It is important that you spend some time during the first class to get to know your students. Use the class introductions to find out a favorite hobby or how the student likes to spend his or her free time. This can help you determine the types of learners in the class so you can decide how best to make assignments. For example, you may decide that all of the crosswords and worksheets in the class should be done individually as homework, or you may want students to complete those assignments in the last 15 minutes of class, working in pairs.

Instructor's Introduction

General classroom strategies

Classroom learning should never consist solely of reviewing textbook information or completing only hands-on exercises. As the instructor, you need to combine methods to address the needs of all students in the classroom, including the following:

1. When presenting theoretical material that may be difficult for some students, begin by presenting a problem that the theory addresses. You might want to give students the problems and let them work on solutions to see the direction they take without the necessary tools.
2. Balance conceptual information with concrete information. For example, present theories, ideals, and future technology proposals—but balance it with concrete information. Use real-world examples and compare non-technical situations to the theories.
3. Use diagrams, charts, slides, and other visual demonstrations in class to aid lectures and discussions. While this may appear redundant to some types of learners, the information will only “click” for others after viewing a slide show presentation on the lecture.
4. Use physical analogies for every abstract concept. For example, if you are discussing the thickness of wires on an integrated circuit, you might explain that a regular sheet of notebook paper is approximately 100 microns thick.
5. Provide time in class for students to review the material and reflect on it, as well as for students to actively participate in some discussion or activity on the topic. One way to accomplish this is to make a one-minute assignment where students can take one minute to summarize a topic, ask a pertinent question, or discuss the key topic. Students can write down their questions or comments, then discuss them in class after the minute is up.
6. Always use small-group problem-solving exercises in the classroom. Ideally, you would use these small groups of three or four students every few classes, then share the small-group findings with the entire class.
7. Encourage or require cooperation on homework or selected assignments. Research shows that cooperative learning is usually more successful than traditional competitive learning.
8. Follow the logical flow of the course topics, but also relate topics to other material in the same course, in other courses or applications, or to the real world.

Instructor's Introduction

Teaching technology in the classroom

All of the learning styles and classroom strategies used in general education are useful in the technology classroom. Several important concerns, however, can impact the efficiency of technology education:

1. One of the most essential elements in the study of technology is solving problems. Technology learning is almost never effective in the long term if it excludes problem solving.
2. Hands-on activities should be aimed at experiential learning rather than at acquiring a specific skill. To acquire the skill necessary to become a PC technician requires more than hands-on learning.
3. Learning in the technology classroom is best accomplished as a small community of learners. Students should have an opportunity to learn, discuss, examine alternatives, and revise their initial findings within the context of the classroom. This implies an open classroom of activity, discussion, exercise, and momentum. As the instructor, you need to encourage participation and ensure that students back up theories and ideas.
4. Don't focus on developing specific technical skills, e.g., how to take apart the classroom PC. Instead, help students develop the thinking skills necessary to handle a variety of situations in today's fast-changing technological world.

iNet+ Certification

Introduction

Course Content

Course Content

Block 01: Overview and Introduction, pages 1-4

Discuss your background, give an overview of the course content, and ask students about their experience with the Internet. Also, explain the class schedule and syllabus and provide a facilities overview (e.g., location of restrooms and water fountains).

Familiarize students with the text by explaining the layout and pointing out essential features, such as the summary text in the left margin of some pages.

Have the students discuss which certifications they are familiar with or plan to pursue. Discuss your own certifications, and those of your students. Which have been useful in business and which have not?

Discuss with your students the relative benefits of vendor neutral and vendor specific certifications.

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Discuss the CompTIA certification suite including the upcoming Server+ and Linux+ certifications.

Point students to the IT Associations document on the Student Disks, which contains information from TechRepublic (www.techrepublic.com) on various organizations appropriate for those in IT careers.

Discuss creating a certification plan. A certification plan can give direction to technical training and keep the student on track to meeting specific career goals.

Be prepared to answer student questions about the iNet+ exams. You should have at least taken the exams and ideally you should be iNet+ certified.

Let the students know that the iNet+ exam covers Internet basics. Although basic knowledge of programming and scripting languages, as well as HTML tags is required, the exam does not test on more than a cursory knowledge of the topics.

CompTIA constantly reviews their exams to determine the need for revisions. The average time between revisions has been about 18 months.

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Emphasize that CompTIA certifications are valid indefinitely. There is no requirement to recertify when a new exam version is released.

Point out that students can locate demo versions of test preparation software from www.measureup.com and www.trancender.com

Remind students that they must register for exams at least 24 hours in advance. Most testing centers only have a small number of test stations, so CompTIA suggests that students register as early as possible to increase the odds of getting the desired date, time, and location.

Provide your students with tips and testing strategies that have been successful for you.

Remind the students to keep their printout showing their exam score until certification materials arrive in the mail. This printout is the only proof they have passed the exam if their records are lost.

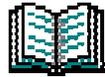
Review the CompTIA website before teaching each course to get the latest information on the current exams. This information will be more current than what appears in the textbook.

Course Content

Block 02: Lesson 1: Internet History, pages 7-13



Lesson 1



iNet+ Certification. Paul A. Nelson.
JES & Co., 2001.

Page references throughout the Instructor Syllabus relate to this textbook, unless otherwise specified.

Pages 7-8

Beginnings of the Internet

At the beginning of this lesson, draw a rough sketch representing the concept of a network of networks. Show how a variety of businesses, organizations, universities, ISPs, and government agencies around the world are connected to the Internet. It can be difficult for some students who have used the Internet at home to see that they are part of an ISP network rather than a single isolated user.

Throughout this course, key terms appear in bold or italic print in the text. Ensure that students understand those terms before moving on to the next lesson. Future concepts usually build on those basic terms.

Emphasize that the Internet was used primarily by academic and research organizations before the

Course Content

mid-1990s. Businesses were not allowed to be part of the network.

Page 9

The 1980s

The public website for DARPA is <http://www.darpa.mil>.

Pages 9-10

The 1990s



One way to demonstrate the difference between the older, text-based Internet and today's graphical-based World Wide Web is to open a Telnet session with an ISP server to demonstrate the textual commands. Connect to a remote site and navigate that site some, if possible. One Telnet site that allows you to navigate is freenet.victoria.bc.ca. Another alternative is to open a text-based FTP client and download information from a site.

Spend some time discussing the impact that the Internet has had on business since businesses began having an online presence in the 1990s.

Discuss how the Internet has impacted sales on an international level. Try to get students to make as many suggestions as possible.

Course Content



Summary, page 12



Review Questions, page 13

Note: Although protocols are mentioned in Lesson 1, they are not defined until Lesson 2. Students may have difficulty answering question 4 at this point.

Answers:

1. False
2. True
3. b. packets
4. c. protocol
5. False



Lab

Have students log onto <http://www.darpa.mil> and visit the various links on that page. Be sure to point out the buttons along the left side of the page for students as well as the links within the text. After each student has had some time to view the site, discuss what students believe is DARPA's role today.



**Kriss Kross puzzle—Lesson 1:
Internet History**

Course Content

Block 03: Lesson 2: Introducing Protocols, pages 15 – 21



Lesson 2

Page 15

Protocols

Emphasize to your students that the way in which the term *protocol* is used in the lesson often refers directly to the OSI layers instead of or along with the traditional use of the term, which is as a set of rules. You may find it helpful to quickly review the OSI layers to help alleviate confusion.

While defining protocols, discuss the non-computer examples (greeting foreign dignitaries and operating a vehicle) and have students brainstorm other examples of protocols in everyday life.

Page 17

Protocols

IPX was created by the XEROX Corporation as a network layer protocol, and is an acronym for Internetwork Packet Exchange.

Explain that the TCP/IP protocol is gradually replacing IPX/SPX, due in large part to the fact that TCP/IP is the primary protocol used for the Internet.

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SPX is an acronym for Sequenced Packet Exchange, and is used in client/server applications.

NetBEUI is an excellent protocol for small networks, but is ill suited for larger, segmented networks.



Summary of Lesson 2, page 20

Review Questions, page 21

Note: you may want to refer students question 4 in the Lesson 1 review questions and discuss it at this point.

Be sure you discuss each answer with students. When an answer to a question is *False*, you can ask students change the statement so that it is *True*.

Answers:

1. a. low-level and high-level
2. True
3. False.
4. d. stacks
5. True



Word Search puzzle—Lesson 2: Introducing Protocols

Course Content

Block 04: Lesson 3: The TCP/IP Protocol Suite, Part I, pages 23-31



Page 23

Lesson 3

Overview

Depending on the experience of your students and on your own preferences, you may want to teach Lessons 3 and 5 before covering Lesson 4.

Pages 24-26

Transport Layer

UDP incorporates protocols that operate at the network, transport, and session layers of the OSI model, and runs over IP.

UDP is detailed in RFC 768; TCP is detailed in RFC 793.

To explain the TCP/IP Connection Process, use the analogy of one of the students in the class picking up the phone to call his/her friend, mother, father, instructor, etc. Dialing the other person's phone number is equivalent to step 1; the phone rings and the other person answers with a greeting, similar to step 2 of the process; finally, the student replies with a greeting, establishing the conversation as in step 3.

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Emphasize that this is simply an analogy and does not indicate that there is a direct match between telephone calls and the TCP/IP connection process.

Explain that a checksum works because the original data provides a specific mathematical value based on the packet contents; if the receiving computer does not receive the same mathematical value as that in the checksum, the receiving computer detects an error. When a computer detects an error, it requests that the data be retransmitted.

Pages 27-29

Internet Layer

Explain to students that they will learn more about actual IP addresses in Lesson 5. It is important at this point to understand the basic concept before learning the details.

After a MAC address is resolved through ARP, the address is stored locally in the ARP cache. When contacting hosts, clients first check the contents of the ARP cache for the host's MAC address. If the host was recently contacted, the client locates the address in cache and makes contact; if the address is not in cache, the host sends an ARP request. ARP is defined in RFC 826.

If time permits, explain to students that *constant mapping*, a less

Course Content

common method of finding the Ethernet or MAC client address, utilizes a combination of Ethernet heading and IP address information to construct the Ethernet address of a client.

Explain to students that they will have an opportunity to work with the *ping* utility in Lesson 5, after examining specific IP addresses.



Lab: Working With the Transport and Internet Layers

Before class, print enough copies of form *TCP/IP Protocol* to ensure that each group of 4 to 8 students can receive two copies. You will divide your students into small groups, preferably 6 people on each group. The *TCP/IP Protocol* form shows a single sentence reading, “We are studying TCP/IP protocols.” Each word has a number in the upper left corner. You will need to provide each group with three copies of the form; a pair of scissors for the sending side; 2 colored markers for each group; 5 small envelopes, numbered 1 through 5 on the front; and one larger envelope that can hold all five smaller envelopes as well as one 8.5” x 11” sheet of paper, with the number 5 marked in black on the front.

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Explain to the class that they will be participating in an exercise to illustrate the Transport and Internet layers. Divide students into groups so that each group can have at least two people on the sending end and two people on the receiving end. The ideal group size would be 3 or 4 people on each side. Hand out the materials to each group.

Explain to the class that the full sentence is the data. To send the data using the TCP/IP protocol suite, the data must be broken into small pieces and placed in packets.

1. Instruct the sending side of each group to cut out the individual words from TWO copies of the handout form. Explain that the second copy is an extra data set.
2. Instruct students in the sending groups to place each word from the sentence in the small envelope with the corresponding number. They should just keep the second set of words for an emergency data replacement. Explain that this is placing the original data, divided into small pieces, into a separate TCP envelope.
3. Instruct students in the sending groups to place each envelope, except either the number 4 or number 5 envelope, in the larger

Course Content

envelope. Explain that this is placing the TCP envelopes in the IP envelope. The corresponding numbers on both the pieces of data and the outer envelope are the equivalent of checksums on the TCP envelopes.

4. Have the sending groups place the third, uncut, copy of the sentences inside the larger envelope that also contains the smaller envelopes.
5. The sending side of each group passes the large envelope to the receiving side of each group.
6. The receiving side of each group compares the checksum on the front of the envelope to the checksum on the large piece of paper inside the envelope, as well as the smaller envelopes inside. All numbers should match.
7. When recipients realize they do not have the same number as indicated by the senders, they need to open each envelope, compare the contents and the IP checksum paper. When they discover the missing piece of data, they need to use the colored marker to specify the data envelope that is missing, pack all data back into the TCP envelopes, and all envelopes back into the IP

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envelope. Finally, they need to use the colored marker to change the checksum on the checksum data form and on the front of the IP envelope.

8. The recipient sends back the IP data packet because of the incorrect checksum.
9. The sender receives the returned IP data packet and opens the packet to determine the problem. After locating the missing data packet, the senders place the missing envelope into the IP envelope and use the colored marker to fix all the numbers, indicating the corrected checksums.
10. The recipient receives the retransmitted data packet and opens it to disclose the complete data – We are studying TCP/IP protocols.

After completing the exercise, have students discuss what occurred and how the checksums helped in the process. You may want to vary this lab and repeat as students gain knowledge. For example, you can use this exercise again when you learn about IP addresses.

Explain to students that in this exercise, they did not actually

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address the data to a recipient; this feature is covered in lesson 5.



Summary of Lesson 3, page 30

Review Questions, page 31

Be sure you discuss each answer with students. When an answer to a question is *False*, you can ask students change the statement so that it is *True*.

Answers:

1. a. Transmission Control Protocol/Internet Protocol
2. True
3. True
4. b. A virtual connection between the sending and receiving PCs
5. False



Lab

Have students log onto <http://www.darpa.mil> and visit the various links on that page. Be sure to point out the buttons along the left side of the page for students as well as the links within the text. After each student has had some time to view the site, discuss what students believe is DARPA's role today.

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Crossword Puzzle—Lesson 3: The TCP/IP Protocol Suite, Part I