Technician License and EMS Course Overview

This course introduces students to the electromagnetic spectrum and amateur (ham) radio. This course spans ten lessons, beginning with radio waves and an introduction to ham radio equipment. As you progress through the course, you will delve into various topics such as frequency, propagation, antennas, electrical components, modulation, and transmitters. You'll also get hands-on experience with activities like using a web-based SDR. Optional activities, such as learning to solder, are also included in the lessons. Each lesson's learning objectives can be viewed by clicking on the respective lesson title in the table below. By the end of the course, you will be prepared to take the Technician License Exam.

Approximate time to complete the course: 30.5 hours.

Lesson 1: Electronic Principles

This comprehensive lesson is designed to equip you with the knowledge and skills necessary to pass the Ham Technician license exam, the entry-level license for Amateur Radio enthusiasts. Through engaging content and practical insights, you will explore what makes Amateur Radio unique, understand the regulatory framework set by the FCC, and discover the wide range of activities and community interactions that await you in the world of ham radio. Whether you're new to the concept or eager to dive in, this course provides a thorough introduction to Amateur Radio and guides you step-by-step toward becoming a licensed ham radio operator.

Learning Objectives:

By the end of the lesson the learner will know or be able to:

1. Understand the uniqueness of amateur radio:
2. Recognize the role of the FCC's in regulating amateur radio and the significance of its rules and guidelines.
3. Identify amateur radio activities from casual conversations to emergency response and technical experimentation.
4. Locate ham radio communities to support, learning, and collaboration.
5. Demonstrate readiness to start operating a ham radio by applying the knowledge gained from the course to real-world scenarios and initial communications.
6. Prepare for the general technician license exam

Approximate time to complete the lesson: 2.5 hours.

LESSON 2: RADIO SIGNALS FUNDAMENTALS

In this lesson we will introduce you to the world of amateur radio and prepare you for the ARRL Ham Technician Exam. This lesson provides essential knowledge of radio signals and waves, ensuring a solid foundation for exam success. Engage with interactive lessons, hands-on activities, and real exam questions to gain a thorough understanding of “The radio spectrum, radio signals, basic radio equipment, and tuning into radio stations.Throughout the lesson, you'll apply your knowledge through practical exercises. You'll learn how to locate radio stations and confidently tackle practice questions that mirror the "Radio Signals Fundamentals" section of the Ham Technician Exam.

Learning Objectives:

By the end of the lesson the learner will know or be able to:

1. Understand the radio spectrum and various signal and wave types.
2. Identify and explain key properties of radio signals
3. Recognize and use basic radio equipment.
4. Locate and tune into basic radio stations, such as amateur repeaters and broadcast stations, using radio receivers.
5. Prepare for the Exam.

Approximate time to complete the lesson: 3 hours.

LESSON 3: RADIO AND SIGNALS FUNDAMENTALS

This lesson introduces the fundamental concepts of amateur radio and its relationship to the electromagnetic spectrum. Participants will explore the role of frequency in radio communication, examine the amateur radio bands allocated within the spectrum, investigate band plans and frequency allocation, analyze propagation characteristics across different frequency bands, and apply this knowledge to practical scenarios in amateur radio operation.

Learning Objectives:

By the end of the lesson the learner will know or be able to**:**

1. Understand the basic principles of the electromagnetic spectrum and its significance in radio communication.
2. Explain the role of frequency in transmitting and receiving radio signals.
3. Identify the amateur radio bands allocated within the electromagnetic spectrum.
4. Describe band plans and frequency allocation for amateur radio operation.
5. Analyze the propagation characteristics of radio waves in various frequency bands.
6. Apply theoretical knowledge to practical scenarios in amateur radio operation.
7. Prepare for the Exam.

Approximate time to complete the lesson: 5.5 hours.

HAM TECHNICIAN LESSON 4: PROPAGATION, ANTENNAS, AND FEED LINES

This lesson delves into the fundamental principles of propagation, antennas, and feed lines in amateur radio operation. Participants will explore how radio signals propagate from one location to another, gain a foundational understanding of antenna design and operation, examine the construction and utilization of feed lines, and learn practical techniques for optimizing antenna systems. By the end of the lesson, students will have the knowledge and skills necessary to effectively design, build, and troubleshoot antenna systems for amateur radio applications.

Learning Objectives:

By the end of the lesson, the learner will know or be able to:

1. Explain how radio signals propagate and the factors that influence propagation.
2. Understand the basic concepts of antenna design, including radiation patterns and gain.
3. Describe the construction and use of feed lines in amateur radio systems.
4. Analyze standing wave ratio (SWR) and its implications for antenna performance.
5. Apply theoretical knowledge to the practical design and implementation of antenna systems.
6. Prepare for the Exam.

Approximate time to complete the lesson: 4.5 hours.

LESSON 5: ELECTRICITY, COMPONENTS, AND CIRCUITS

This lesson provides a comprehensive introduction to the fundamentals of electricity, electronic components, and basic circuits. Participants will explore key concepts such as voltage, current, resistance, capacitance, and inductance, gaining an understanding of how these elements interact within electrical circuits. Additionally, learners will be introduced to common electronic components and basic radio circuits, laying the groundwork for further exploration in the field of electronics and radio communication. You will also review questions from the actual ARRL Technicians Exam.

Learning Objectives:

By the end of the lesson, the learner will know or be able to:

1. Define the fundamentals of electricity and circuits.
2. Explain the concepts of voltage and current and their relationship in electrical circuits.
3. Describe the properties of resistance, capacitance, and inductance and their role in electronic circuits.
4. Understand the concepts of reactance, impedance, and resonance in AC circuits.
5. Identify common types of electronic components and their functions.
6. Analyze basic radio circuits and their components.
7. Prepare for the Exam.

Approximate time to complete the lesson: 1 hour.

LESSON 6: AMATEUR RADIO EQUIPMENT

This lesson provides an in-depth exploration of modulation, the basic operation of transmitters, receivers, and amplifiers, digital mode characteristics, and power supplies and batteries in the context of amateur radio operation. Participants will gain an understanding of how information is combined with radio frequency (RF) signals through modulation techniques, learn the essential functions of transmitters, receivers, and amplifiers, explore digital modes commonly used in ham radio communication, and examine the importance of power supplies and batteries as supporting accessories for radio equipment. You will also review questions from the actual ARRL Technicians Exam.

LEARNING OBJECTIVES:

By the end of the lesson, the learner will know or be able to:

1. Explain the concept of modulation and how information is combined with radio frequency signals.
2. Describe the basic operation of transmitters, receivers, and amplifiers in radio communication systems.
3. Identify common modulation techniques used in ham radio, including amplitude modulation (AM), frequency modulation (FM), and digital modes.
4. Understand the characteristics and advantages of digital modes in ham radio communication.
5. Discuss the importance of power supplies and batteries in supporting radio equipment operation.
6. Demonstrate the proper operation of radio equipment, including tuning, modulation selection, and signal reception.
7. Prepare for the Exam.

Approximate time to complete the lesson: 4.5 hours.

LESSON 7: COMMUNICATING WITH OTHER HAMS

This lesson focuses on the practical aspects of operating in amateur radio, covering topics such as making contacts, using repeaters, participating in nets, engaging in public service communications, collaborating with amateur emergency organizations, and operating via satellites. Participants will learn the procedures and etiquette associated with each aspect of amateur radio operation, emphasizing the importance of good amateur practices for successful and effective communication. You will also review questions from the actual ARRL Technicians Exam.

Learning Objectives:

By the end of the lesson, the learner will know or be able to:

1. Understand where and how contacts are made in amateur radio, including the use of call signs, frequencies, and operating modes.
2. Describe the role and function of repeaters in extending the range of VHF and UHF communication.
3. Explain the concept of nets and the protocols for participating in organized on-air gatherings.
4. Identify opportunities for participating in public service communications as an amateur radio operator.
5. Describe the role of amateur emergency organizations in providing communication support during emergencies and disasters.
6. Explain the basics of operating via satellites and the unique challenges and opportunities associated with satellite communication.
7. Prepare for the Exam.

Approximate time to complete the lesson: 3 hours.

LESSON 8: LICENSING REGULATIONS

This lesson focuses on the practical aspects of operating in amateur radio, covering topics such as making contacts, using repeaters, participating in nets, engaging in public service communications, collaborating with amateur emergency organizations, and operating via satellites. Participants will learn the procedures and etiquette associated with each aspect of amateur radio operation, emphasizing the importance of good amateur practices for successful and effective communication.

LEARNING OBJECTIVES:

By the end of the lesson, the learner will know or be able to:

1. Understand where and how contacts are made in amateur radio, including the use of call signs, frequencies, and operating modes.
2. Describe the role and function of repeaters in extending the range of VHF and UHF communication.
3. Explain the concept of nets and the protocols for participating in organized on-air gatherings.
4. Identify opportunities for participating in public service communications as an amateur radio operator.
5. Describe the role of amateur emergency organizations in providing communication support during emergencies and disasters.
6. Explain the basics of operating via satellites and the unique challenges and opportunities associated with satellite communication.
7. Prepare to take the Exam.

Approximate time to complete the lesson: 2 hours.

LESSON 9: OPERATING REGULATIONS

This lesson provides an in-depth exploration of the rules and regulations governing amateur radio operation, as outlined by the Federal Communications Commission (FCC) and international radio governing bodies. Participants will learn how FCC rules are organized, understand the mission of amateur radio, explore the different types of licenses available, examine the licensing exam process and the role of Volunteer Examiners, discuss the responsibilities of licensees, and gain insight into frequency and emission privileges, international radio rules, and amateur call signs. By the end of the course, students will have a comprehensive understanding of the administrative regulations that govern amateur radio operation.

Learning Objectives:

By the end of the lesson, the learner will know or be able to:

1. Understand the roles and responsibilities of control operators and control points in amateur radio operation.
2. Identify the privileges and responsibilities associated with guest operating under the supervision of a control operator.
3. Explain the protocols and methods for proper identification on the air, including station call signs and operator call signs.
4. Discuss the guidelines and limitations for third-party communications and interference mitigation in amateur radio.
5. Describe the principles and guidelines for remote operation and automatic control of amateur radio stations, including prohibited communications.
6. Prepare to take the Exam.

Approximate time to complete the lesson: 1.5 hours.

LESSON 10: OPERATING REGULATIONS

This lesson provides essential knowledge and skills for working safely with electricity and managing radio frequency (RF) hazards in amateur radio operations. Participants will learn about AC safety grounding, lightning protection, RF current management, RF interference (RFI), RF exposure rules, and tower and antenna installation safety. Emphasis will be placed on understanding and implementing safety practices to mitigate risks associated with electricity and RF exposure in amateur radio activities.

Learning Objectives:

By the end of the lesson, the learner will know or be able to:

1. By the end of the lesson, the learner will be able to:
2. Understand basic electrical safety principles for amateur radio.
3. Identify the importance of AC safety grounding and lightning protection.
4. Explain strategies for managing RF current and mitigating interference.
5. Interpret RF exposure guidelines to evaluate exposure levels and assure safety.
6. Apply safety protocols for tower and antenna installation.
7. Prepare for the exam.

Approximate time to complete the lesson: 1.5 hours.

LESSON 11: PREPARE FOR THE EXAM

This lesson is designed to prepare individuals for the Ham Radio Technician license exam administered by the Federal Communications Commission (FCC). Participants will receive comprehensive instruction and guidance on the topics covered in the exam, including radio theory, regulations, operating procedures, and safety practices. Through a combination of lectures, practice exams, and study resources, students will gain the knowledge and skills necessary to successfully pass the exam and obtain their Technician-Class license. Additionally, the course will provide valuable insights into the amateur radio community and the opportunities available to licensed operators.

Learning Objectives:

By the end of the lesson, the learner will know or be able to:

1. Understand basic radio theory and wave propagation.
2. Interpret FCC regulations and operating procedures.
3. Apply safety practices with amateur radio equipment.

4. Use resources to pass the Ham Radio Technician exam.
5. Navigate the licensing process and obtain a call sign.

Approximate time to complete the lesson: 1.5 hours.