

Course Information

HAM Radio Board of Education - It is intended to be a focused educational tool to expand the knowledge of potential and existing ham operators so the hobby will be ever more enjoyable.

No prerequisites required.

Recommended Textbooks

98th edition 2021 ARRL Handbook

24th edition ARRL Antenna Book

Course Description

Fundamentals/Theory of Electrical, Radio and Circuits and Components.

Antenna Fundamentals

Antennas for Low Frequency, Medium Frequency and High Frequency

Antennas for VHF through Microwave and Specialty Antennas

Transmission Lines and Building Antenna Systems

Course Objectives

Upon Completion of this course, students will obtain:

Knowledge of AC and DC power to include resistance/conductance, power and energy, capacitance/inductance, and semiconductor devices.

Knowledge of AC waveforms, measuring voltage, current and power. An understanding of capacitors, inductors, reactance/impedance, and quality factor of components. An understanding of resonant circuits, analog signal processing and electromagnetic waves.

Knowledge of circuits and components including resistors, capacitors, inductors, transformers, semiconductors, amplifiers, heat management and analog-digital interfacing.

Knowledge of dipoles and monopoles, effects of ground, radio wave propagation, loop antennas, multielement arrays and antenna modeling.

Knowledge of single-band MF and HF antennas, multiband HF antennas, HF Yagi and Quad antennas, broadside and end-fire arrays, long-wire and traveling wave antennas, HF antenna system design.

Knowledge of VHF/UHF and microwave antennas, VHF/UHF mobile and rover antennas, antennas for space communications, stealth and limited space antennas, mobile and maritime HF antennas, receiving and direction-finding antennas.

Knowledge of transmission lines, transmission line system techniques, antenna material and construction, building antenna systems and towers, antenna and transmission line measurements, and antenna system troubleshooting.

Resources for Students

There may be other materials recommended by instructors.

Assignments and Homework

Reading chapters prior to class

Course Expectations

You can expect:

To be treated with the respect.

Class to start on time.

The instructor to be fully prepared.

We can expect you:

To be respectful.

To be on time for class.

To have studied the material prior to class.

To participate in class.

Contact for Course:

Mike Hanks

AG7XQ

President NADXA

president@nadxa.com

Schedule and Instructor	Description of Class	Reading Assignments
Week 1 May 15, 2021 Course Introduction: Mike Course Instructor: Bill	Overview and Introduction of Course Intro to electricity/resistance/conductance/power/energy basic circuit principles/capacitance/inductance+	Course Introduction Chapter 2 ARRL Handbook – Electrical Fundamentals
Week 2 May 22, 2021 Course Instructor: Pete	AC waveforms, measuring AC voltage/current/power/effective radiated power/capacitors/inductors/reactance/impedanc e+	Chapter 3 ARRL Handbook-Radio Fundamentals
Week 3 May 29, 2021 Course Instructor: Phil	Resistors/capacitors/inductors/transformers/semi conductors/amplifiers+	Chapter 4 4.1 – 4.5.6 ARRL Handbook-Circuits & Components
Week 4 June 5, 2021 Course Instructor: Bill	Operational Ampl ifiers/Analog ICs/Analog digital interface/Analog device/Circuits/Heat management+	Chapter 4 4.5.7 – 4.11.11 ARRL Handbook – Circuits & Components
Week 5 June 12, 2021 Course Instructor: Jack	Nature of Radio Waves/HF Sky-wave propagation/When and Where HF bands are open/Propagation prediction software+	Chapter 4 Antenna Book-Radio Propagation
Week 6 June 19, 2021 Course Instructor: Ron	Polarization/RF Electromagnetic waves/Antenna impedance/Directivity/Gain radiation/Dipoles/Monopoles+	Chapter 1 and 2 ARRL Antenna Book – Antenna Fundamentals/Dipoles/Mo nopoles
Week 7 July 10, 2021 Course Instructor: Pete	Effects of ground/Near and Far field/Ground systems for vertical monopoles/Ground parameters for antenna analysis+	Chapter 3 ARRL Antenna Book – The Effects of Ground
Week 8 July 17, 2021 Course Instructor: TBA	Large Loops/Small Receiving Loops/Small Transmitting Loops Construction Guidelines Small Transmitting Loops+	Chapter 5 ARRL Antenna Book – Loop Antennas

<p>Week 9 July 24, 2021 Course Instructor: Phil</p>	<p>Creating Gain and Directivity/Driven Arrays/Phased Array Techniques/Phased Array Design/Practical Aspects+</p>	<p>Chapter 5 ARRL Antenna Book – Multielement Arrays</p>
<p>Week 10 July 31, 2021 Course Instructor: Jack</p>	<p>Basic LPDA Design/Designing an LPDA/LPDA HF Projects Antenna Analysis by Computer/Basics of Antenna Modeling+</p>	<p>Chapter 7 and 8 ARRL Antenna Book – Log Periodic Dipole Arrays/Antenna Modeling</p>
<p>Week 11 August 7, 2021 Course Instructor: TBA</p>	<p>Horizontal, Vertical Antennas/Loading Techniques for Short Antennas/Inverted L & T Antennas/Half- Sloper/LF/MF+</p>	<p>Chapter 9 ARRL Antenna Book – Single Band MF & HF Antennas</p>
<p>Week 12 August 14, 2021 Course Instructor: Ron</p>	<p>Simple Wire Antennas/Trap Dipoles/Terminated Folded Dipole Multi-Band Vertical/Coupled- Resonator Dipole/Loop+</p>	<p>Chapter 10 ARRL Antenna Book –Multi- Band HF Antennas</p>
<p>Week 13 August 21, 2021 Course Instructor: Jack</p>	<p>Yagi Antenna/Yagi Performance/Monoband Yagi Performance & Designs/Multiband Yagis/Shorting Yagi Elements+</p>	<p>Chapter 11 ARRL Antenna Book – HF Yagi and Quad Antennas</p>
<p>Week 14 August 28, 2021 Course Instructor: TBA</p>	<p>Broadside Arrays/Parallel Broadside Arrays/End- Fire Arrays Long Wires/Resonant Rombic/Terminated Long Wire+</p>	<p>Chapters 12 and 13 ARRL Antenna Book- Broadside & End-Fire Arrays/Long Wire & Traveling Wire Antennas</p>
<p>Week 15 September 4, 2021 Course Instructor: TBA</p>	<p>System Design Basics/Propagation and Coverage/Effects of local terrain/Stacking Yagis & Switching Systems+</p>	<p>Chapter 14 ARRL Antenna Book – HF Antenna System Design</p>
<p>Week 16 September 11, 2021 Course Instructor: Pete</p>	<p>Design Factors at and above VHF/Basic Antennas for VHF, UHF/ Yagis and Quads at VHF, UHF+</p>	<p>Chapter 15 15.1 – 15.3.8 ARRL Antenna Book – VHF, UHF & Microwave Antennas</p>

<p>Week 17 September 18, 2021 Course Instructor: Pete</p>	<p>Log Periodic & Discone Antennas/Reflector Antennas/Helical Antennas/Microwave Antennas+</p>	<p>Chapter 15 15.4 – 15.7.8 ARRL Antenna Book-VHF, UHF & Microwave Antennas</p>
<p>Week 18 September 25, 2021 Course Instructor: Bill</p>	<p>Antennas for VHF-UHF FM/Mounts for Whip Antennas/Bike Mobile Antennas, VHF-UHF/Rover Antennas Systems/Projects Space Communication Antennas/Circularly Polarized/Yagis Arrays/Parabolic Reflectors/Antennas Position Control+</p>	<p>Chapters 16 and 17 ARRL Antenna Book – VHF, UHF & Rover Antennas/Antennas for Space Communications</p>
<p>Week 19 October 2, 2021 Course Instructor: Pete</p>	<p>Transmission Lines & Devices/Impedance Matching/Baluns Stacking Yagis/Weather proofing Relays & Pre-Amps/Horizontal Antennas/Vertical Antennas/Beam Antennas/Portable Masts & Supports+</p>	<p>Chapters 18 and 19 ARRL Antenna Book – VHF, UHF Microwave Antennas Systems/Portable Antenna Systems</p>
<p>Week 20 October 9, 2021 Course Instructor: TBA</p>	<p>Safety/Locations for Antennas/RF Interference/Indoor Antennas/Outdoor Antennas/Small Transmitting Loops+</p>	<p>Chapters 20 and 21 ARRL Antenna Book – Stealth & Limited Space Antennas/Mobile & Maritime HF Antennas</p>
<p>Week 21 October 16, 2021 Course Instructor: Mike</p>	<p>Receiving Antennas/Direction-Finding Antennas</p>	<p>Chapter 22 ARRL Antenna Book – Receiving & Direction- Finding Antennas</p>
<p>Week 22 October 23, 2021 Course Instructor: Pete</p>	<p>Basic Theory/Practical Transmission Lines/Feedline Construction & Operating Characteristics/RF Connectors/Choosing & Installing Feed Lines+</p>	<p>Chapter 23 ARRL Antenna Book – Transmission Lines</p>
<p>Week 23 October 30, 2021 Course Instructor: Pete</p>	<p>Coupling the Transmitter & The Line/Impedance Matching Networks/Transmission Line System Design/Transmission Line Matching Devices+</p>	<p>Chapter 24 24.1 – 24.4.6 ARRL Antenna Book- Transmission Line System Techniques</p>

<p>Week 24 November 6, 2021 Course Instructor: Pete</p>	<p>Matching the Impedance to the Antenna/Common-Mode Transmission Line Current/Current Baluns, Chokes & Choke Baluns/Transmission-Line Baluns & Matching Devices+</p>	<p>Chapter 24 24.5 – 24.8.4 ARRL Antenna Book- Transmission Line System Techniques</p>
<p>Week 25 November 13, 2021 Course Instructor: Bill</p>	<p>Wire for Antenna Systems/Antenna Insulators/Antennas of Aluminum Tubing/Other Materials for Antenna Constructions Hardware+</p>	<p>Chapter 24 Discussion Chapter 25 ARRL Antenna Book- Antenna Materials & Constructions</p>
<p>Week 26 November 20, 2021 Course Instructor: Bill</p>	<p>Safety & Safety Equipment/Trees & Masts/Types of Towers Engineering the Tower Project/Tools & Equipment/Tower Construction+</p>	<p>Chapter 26 26.1 – 26.6.6 ARRL Antenna Book- Building Antenna Systems & Towers</p>
<p>Week 27 November 27, 2021 Course Instructor: TBA</p>	<p>Raising & Lowering Antennas/Cables & Connectors/Rotators Grounding & Lightning Protection/Corrosion/General Maintenance+</p>	<p>Chapter 26 26.7 – 26.12.4 ARRL Antenna Book – Building Antenna Systems & Towers</p>
<p>Week 28 December 4, 2021 Course Instructor: Pete</p>	<p>Line Current & Voltage/SWR Measurements/RF Power Measurement/Field Strength Meters/Antenna Analyzer Measurements/Time-Domain Reflectometry/Vector Network Analyzer/Antenna Field Measurements+</p>	<p>Chapter 27 ARRL Antenna Book – Antenna & Transmission Line Measurements</p>
<p>Week 29 December 11, 2021 Course Instructor: Jack</p>	<p>Antenna System Trouble Shooting for the Beginners/Guidelines for Antenna System Troubleshooting/Analyzing an Antenna Problem/Antenna Turner Troubleshooting & Repair/Refurbishing Aluminum Antennas+</p>	<p>Chapter 27 Discussion Chapter 28 ARRL Antenna Book – Antenna Trouble Shooting</p>