

## HVAC PE Course Syllabus (On Demand Portion - 199 hours)

Section 1 - Basic Engineering Practice	<b>Classwork Lecture (Videos)</b>			Hours
	1	Video 1 Engineering Economic Analysis (33 Minutes)		0.6
	2	Video 2 Engineering Economics Rate of Return & Depreciation (31 Minutes)		0.5
	3	Video 3 Units and Conversions (32 minutes)		0.5
	4	Video 4 Electrical Concepts DC Circuits (13 minutes)		0.2
	5	Video 5 Electrical Concepts AC Circuits and Power (25 minutes)		0.4
	6	Video 6 Electrical Concepts Motors (19 minutes)		0.3
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Units & Conversions		0.2
	2	Watch Video 2 - Practice Problem 2 - Economic Analysis		0.2
	3	Watch Video 3 - Practice Problem 3 - Economic Analysis		0.2
	4	Watch Video 4 - Practice Problem 4 - Electrical Concepts		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Basic Engineering Practice Section	Book: Technical Study Guide	2
	2	Complete all Basic Engineering Practice problems	Book: Technical Study Guide	2
	<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
	1	1st Basic Engineering Practice Practice Exam (4 Problems: Difficulty Level - Easy to Medium)		2
	2	2nd Basic Engineering Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		2
	3	Check practice exam solutions	Solutions released after you submit your answers.	2
		<b>Total:</b>	<b>13</b>	

<b>Section 2 - Thermodynamics</b>	<b>Classwork Lecture (Videos)</b>			Hours
	1	Video 1 Thermodynamics Properties (20 minutes)		0.3
	2	Video 2 Vapor Compression Cycle (22 minutes)		0.4
	3	Video 3 Pressure Enthalpy Diagram & Vapor Compression Cycle (26 minutes)		0.4
	4	Video 4 Steam Tables (26 minutes)		0.4
				1
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Thermodynamics - Refrigerants		0.2
	2	Watch Video 2 - Practice Problem 2 - Thermodynamics - Refrigerants		0.2
	3	Watch Video 3 - Practice Problem 3 - Thermodynamics - Steam		0.2
	4	Watch Video 4 - Practice Problem 4 - Thermodynamics - Steam		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Thermodynamics section	Book: Technical Study Guide	2
	2	Complete all Thermodynamics practice problems	Book: Technical Study Guide	2
	3			
	<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
	1	1st Thermodynamics Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		2
	2	2nd Thermodynamics Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		2
	3	Check practice exam solutions	Solutions released after you submit your answers.	2
		<b>Total:</b>	<b>13.2</b>	

Section 3 - Psychrometrics				
<b>Section 3 - Psychrometrics</b>	<b>Classwork (Videos)</b>			Hours
	1	Video 1 Psychrometric Chart (28 minutes)		0.5
	2	Video 2 Sensible and Latent Movements (34 minutes)		0.6
	3	Video 3 Cooling Coil on Psych Chart (10 minutes)		0.2
	4	Video 4 Heating Coil on Psych Chart (12 minutes)		0.2
	5	Video 5 Mixing Air Streams on Psych Chart (5 minutes)		0.1
	6	Video 6 Air Washer on Psych Chart (12 minutes)		0.2
	7	Video 7 Steam Humidifier on Psych Chart (5 minutes)		0.1
	8	Video 8 Dehumidifier on Psych Chart (6 minutes)		0.1
	9	Video 9 Space Heat Gain on Psych Chart (14 minutes)		0.2
10	Video 10 Psych Chart at Different Elevations (12 minutes)		0.2	
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Navigating the Psychrometric Chart		0.2
	2	Watch Video 2 - Practice Problem 2 - Navigating the Psychrometric Chart		0.2
	3	Watch Video 3 - Practice Problem 3 - Navigating the Psychrometric Chart		0.2
	4	Watch Video 4 - Practice Problem 4 - Movement on the Psychrometric Chart		0.2
	5	Watch Video 5 - Practice Problem 5 - Movement on the Psychrometric Chart		0.2
	6	Watch Video 6 - Practice Problem 6 - Movement on the Psychrometric Chart		0.2
	7	Watch Video 7 - Practice Problem 7 - Movement on the Psychrometric Chart		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Psychrometrics Section	Book: Technical Study Guide	4
	2	Complete all Psychrometrics practice problems	Book: Technical Study Guide	4
	<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
	1	1st Psychrometrics Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		3
	2	2nd Psychrometrics Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		3
	3	Check practice exam solutions	Solutions released after you submit your answers.	3
			<b>Total:</b>	<b>20.5</b>

Section 4 - Heat Transfer				
Section 4 - Heat Transfer	<b>Classwork (Videos)</b>			Hours
	1	Video 1 Conduction (28 minutes)		0.5
	2	Video 2 Convection (16 minutes)		0.3
	3	Video 3 Radiation (16 minutes)		0.3
	4	Video 4 Heat Exchanger Introduction (12 minutes)		0.2
	5	Video 5 Heat Exchanger LMTD (21 minutes)		0.4
	6	Video 6 Heat Exchanger NTU (11 minutes)		0.2
	7	Video 7 Overall Heat Transfer Coefficient (14 minutes)		0.2
	8	Video 8 Controlling Surface Temperature (9 minutes)		0.2
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Heat Transfer - Conduction		0.2
	2	Watch Video 2 - Practice Problem 2 - Heat Transfer - Convection		0.2
	3	Watch Video 3 - Practice Problem 3 - Heat Transfer - Radiation		0.2
	4	Watch Video 4 - Practice Problem 4 - Heat Transfer - Convection & Radiation in Parallel		0.2
	5	Watch Video 5 - Practice Problem 5 - Heat Transfer - Conduction in Series		0.2
	6	Watch Video 6 - Practice Problem 6 - Heat Transfer - Conduction in Parallel		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Heat Transfer Section	Book: Technical Study Guide	3
	2	Complete all Heat Transfer practice problems	Book: Technical Study Guide	3
	<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
	1	1st Heat Transfer Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		2.5
	2	2nd Heat Transfer Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		2.5
	3	Check practice exam solutions		Solutions released after you submit your answers. 2.5
	<b>Total:</b>			<b>16.6</b>

<b>Section 5 - Fluid Mechanics</b>	<b>Classwork (Videos)</b>			Hours
	1	Video 1 Fluid Properties (15 minutes)		0.3
	2	Video 2 Bernoullis Equation (11 minutes)		0.2
	3	Video 3 Darcy Weisbach (15 minutes)		0.3
	4	Video 4 Hazen Williams (14 minutes)		0.2
	5	Video 5 Manometers (11 minutes)		0.2
	6	Video 6 Pitot Tubes (19 minutes)		0.3
	7	Video 7 Venturi Meters (9 minutes)		0.2
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Fluid Properties		0.2
	2	Watch Video 2 - Practice Problem 2 - Fluid Statics		0.2
	3	Watch Video 3 - Practice Problem 3 - Bernoulli's		0.2
	4	Watch Video 4 - Practice Problem 4 - Manometer		0.2
	5	Watch Video 5 - Practice Problem 5 - Pitot Tube		0.2
	6	Watch Video 6 - Practice Problem 6 - Venturi Meter		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Fluid Mechanics Section	Book: Technical Study Guide	2
	2	Complete all Fluid Mechanics practice problems	Book: Technical Study Guide	2
	<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
	1	1st Fluid Mechanics Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		2
2	2nd Fluid Mechanics Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		2	
3	Check practice exam solutions	Solutions released after you submit your answers.	2	
<b>Total:</b>			<b>12.6</b>	
<b>Section 6 - Energy/Mass Balance</b>	<b>Classwork (Videos)</b>			Hours
	1	Video 1 Energy Balance (30 minutes)		0.5
	2	Video 2 Mass Balance (12 minutes)		0.2
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Air to Air Energy Balance		0.2
	2	Watch Video 2 - Practice Problem 2 - Air to Water Energy Balance		0.2
	3	Watch Video 3 - Practice Problem 3 - Water to Water Energy Balance		0.2
	4	Watch Video 4 - Practice Problem 4 - Energy Balance Phase Change		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Energy/Mass Balance Section	Book: Technical Study Guide	2
	2	Complete all Energy/Mass Balance practice problems	Book: Technical Study Guide	2
	<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
	1	1st Energy/Mass Balance Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		2
	2	2nd Energy/Mass Balance Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		2
	3	Check practice exam solutions	Solutions released after you submit your answers.	2
	<b>Total:</b>			<b>11.4</b>

**Section 7 - Heating/Cooling Loads**

<b>Classwork (Videos)</b>			Hours
1	Video 1 Heating-Cooling Loads Overview (12 minutes)		0.2
2	Video 2 External Loads Roofs and Walls (18 minutes)		0.3
3	Video 3 External Loads Windows and Skylights (17 minutes)		0.3
4	Video 4 Internal Loads People (9 minutes)		0.2
5	Video 5 Internal Loads Lighting (13 minutes)		0.2
6	Video 6 Internal Loads Miscellaneous Equipment (22 minutes)		0.4
7	Video 7 Heat Gain from Pipes, Ducts and Equipment Surfaces (6 minutes)		0.1
8	Video 8 Ventilation Loads (10 minutes)		0.2
9	Video 9 Infiltration Loads (11 minutes)		0.2
10	Video 10 Heating Loads (4 minutes)		0.1
<b>Classwork Practice Problem (Videos)</b>			Hours
1	Watch Video 1 - Practice Problem 1 - External Loads		0.2
2	Watch Video 2 - Practice Problem 2 - External Loads		0.2
3	Watch Video 3 - Practice Problem 3 - External Loads		0.2
4	Watch Video 4 - Practice Problem 4 - Internal Loads		0.2
5	Watch Video 5 - Practice Problem 5 - Internal Loads		0.2
6	Watch Video 6 - Practice Problem 6 - Internal Loads		0.2
7	Watch Video 7 - Practice Problem 7 - Internal Loads		0.2
<b>Homework (Reading and Practice Problems)</b>			Hours
1	Read Heating/Cooling Loads Section	Book: Technical Study Guide	3
2	Complete all Heating/Cooling Loads practice problems	Book: Technical Study Guide	3
<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
1	1st Heating/Cooling Loads Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		3
2	2nd Heating/Cooling Loads Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		3
3	Check practice exam solutions	Solutions released after you submit your answers.	3
<b>Total:</b>			<b>18.4</b>

## Section 8 - HVAC Equipment & Components

<b>Classwork (Videos)</b>			Hours
1	Video 1 Cooling Tower Construction (12 minutes)		0.2
2	Video 2 Cooling Tower Types (9 minutes)		0.2
3	Video 3 Cooling Tower Performance (22 minutes)		0.4
4	Video 4 Fluid Coolers (15 minutes)		0.3
5	Video 5 Boilers (23 minutes)		0.4
6	Video 6 Furnaces (7 minutes)		0.1
7	Video 7 Combustion (23 minutes)		0.4
8	Video 8 Heat Exchangers (22 minutes)		0.4
9	Video 9 AC Equipment Overview (8 minutes)		0.1
10	Video 10 Chillers (21 minutes)		0.4
11	Video 11 Absorption Chillers (10 minutes)		0.2
12	Video 12 Heat Pumps (15 minutes)		0.3
13	Video 13 Variable Refrigerant Flow (15 minutes)		0.3
14	Video 14 Pump Types (17 minutes)		0.3
15	Video 15 Pump Curves (21 minutes)		0.4
16	Video 16 Pump Affinity Laws (13 minutes)		0.2
17	Video 17 Fan Types and Construction (15 minutes)		0.3
18	Video 18 Fan Curves (9 minutes)		0.2
19	Video 19 Fan Affinity Laws (15 minutes)		0.3
20A	Video 20A Compressors (15 minutes)		0.3
20B	Video 20B Compressor Laws (5 minutes)		0.1
21	Video 21 Cooling Coils (17 minutes)		0.3
22	Video 22 Heating Coils (9 minutes)		0.2
23	Video 23 Chilled Beams (19 minutes)		0.3
24	Video 24 Humidifiers (14 minutes)		0.2
25	Video 25 Dehumidifiers (10 minutes)		0.2
26	Video 26 Dampers (12 minutes)		0.2
27	Video 27 Valves (25 minutes)		0.4
28	Video 28 Refrigerants (20 minutes)		0.3
29	Video 29 Refrigeration Components (11 minutes)		0.2
<b>Classwork Practice Problem (Videos)</b>			Hours
1	Watch Video 1 - Practice Problem 1 - Cooling Towers		0.2
2	Watch Video 2 - Practice Problem 2 - Cooling Towers		0.2
3	Watch Video 3 - Practice Problem 3 - Boilers		0.2
4	Watch Video 4 - Practice Problem 4 - Boilers		0.2
5	Watch Video 5 - Practice Problem 5 - Pumps		0.2
6	Watch Video 6 - Practice Problem 6 - Pumps		0.2
7	Watch Video 7 - Practice Problem 7 - Fans		0.2
8	Watch Video 8 - Practice Problem 8 - Fans		0.2
9	Watch Video 9 - Practice Problem 9 - Compressors		0.2
10	Watch Video 10 - Practice Problem 10 - Cooling Coils		0.2
11	Watch Video 11 - Practice Problem 11 - Heating Coils		0.2
12	Watch Video 12 - Practice Problem 12 - Chilled Beams		0.2
13	Watch Video 13 - Practice Problem 13 - Humidifiers		0.2
14	Watch Video 14 - Practice Problem 14 - Dampers		0.2
15	Watch Video 15 - Practice Problem 15 - Valves		0.2
16	Watch Video 16 - Practice Problem 16 - Refrigerants		0.2
<b>Homework (Reading and Practice Problems)</b>			Hours
1	Read HVAC Equipment & Components Section	Book: Technical Study Guide	5
2	Complete all HVAC Equipment & Components practice problems	Book: Technical Study Guide	5
<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
1	1st HVAC Equipment/Components Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		5
2	2nd HVAC Equipment/Components Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		5
3	Check practice exam solutions	Solutions released after you submit your answers.	5
<b>Total:</b>			<b>35.2</b>

# Section 9 - HVAC Systems & Components

<b>Classwork (Videos)</b>			Hours
1	Video 1 Air Distribution Systems Overview (9 minutes)		0.2
2	Video 2 Air Handling Units (15 minutes)		0.3
3	Video 3 Air Distribution Ducts (12 minutes)		0.2
4	Video 4 Air Distribution Terminal Units (20 minutes)		0.3
5	Video 5 Air Distribution Diffusers (22 minutes)		0.4
6	Video 6 Fluid Distribution Overview (10 minutes)		0.2
7	Video 7 Open Systems (19 minutes)		0.3
8	Video 8 Closed Systems (20 minutes)		0.3
9	Video 9 NPSHA (17 minutes)		0.3
10	Video 10 Reverse vs Direct Return (11 minutes)		0.2
11	Video 11 Pipe Anchors (18 minutes)		0.3
12	Video 12 Refrigeration (19 minutes)		0.3
13	Video 13 Energy Recovery Wheels (20 minutes)		0.3
14	Video 14 Heat Pipes (10 minutes)		0.2
15	Video 15 Run Around Systems (10 minutes)		0.2
16	Video 16 Basic Control Concepts (25 minutes)		0.4
17	Video 17 Economizers (9 minutes)		0.2
18	Video 18 Temperature Reset (7 minutes)		0.1
<b>Classwork Practice Problem (Videos)</b>			Hours
1	Watch Video 1 - Practice Problem 1 - Air Distribution		0.2
2	Watch Video 2 - Practice Problem 2 - Air Distribution		0.2
3	Watch Video 3 - Practice Problem 3 - Air Distribution		0.2
4	Watch Video 4 - Practice Problem 4 - Fluid Distribution		0.2
5	Watch Video 5 - Practice Problem 5 - Fluid Distribution		0.2
6	Watch Video 6 - Practice Problem 6 - Fluid Distribution		0.2
7	Watch Video 7 - Practice Problem 7 - Refrigeration		0.2
8	Watch Video 8 - Practice Problem 8 - Refrigeration		0.2
3	Watch Video 9 - Practice Problem 9 - Energy Recover		0.2
4	Watch Video 10 - Practice Problem 10 - Energy Recovery		0.2
5	Watch Video 11 - Practice Problem 11 - Controls		0.2
6	Watch Video 12 - Practice Problem 12 - Controls		0.2
<b>Homework (Reading and Practice Problems)</b>			Hours
1	Read HVAC Systems & Components Section	Book: Technical Study Guide	5
2	Complete all HVAC Systems & Components practice problems	Book: Technical Study Guide	5
<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours
1	1st HVAC Systems & Components Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		5
2	2nd HVAC Systems & Components Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		5
3	Check practice exam solutions	Solutions released after you submit your answers.	5
<b>Total:</b>			<b>31.6</b>



Section 10 - Supportive Knowledge				
Section 10 - Supportive Knowledge	<b>Classwork (Videos)</b>			Hours
	1	Video 1 ASHRAE 15 (9 minutes)		0.2
	2	Video 2 ASHRAE 34 (9 minutes)		0.2
	3	Video 3 ASHRAE 55 (10 minutes)		0.2
	4	Video 4 ASHRAE 62.1 (11 minutes)		0.2
	5	Video 5 ASHRAE 90.1 (5 minutes)		0.1
	6	Video 6 NFPA 90A 90B (5 minutes)		0.1
	7	Video 7 NFPA 96 (4 minutes)		0.1
	8	Video 8 Air Quality and Ventilation (7 minutes)		0.1
	9	Video 9 Air Filtration (6 minutes)		0.1
	10	Video 10 Vibration (12 minutes)		0.2
	11	Video 11 Acoustics Indoors (20 minutes)		0.3
	12	Video 12 Acoustics Outdoors (12 minutes)		0.2
	<b>Classwork Practice Problem (Videos)</b>			Hours
	1	Watch Video 1 - Practice Problem 1 - Codes		0.2
	2	Watch Video 2 - Practice Problem 2 - Air Quality		0.2
	3	Watch Video 3 - Practice Problem 3 - Acoustics		0.2
	<b>Homework (Reading and Practice Problems)</b>			Hours
	1	Read Supportive Knowledge Section	Book: Technical Study Guide	2
	2	Complete all Supportive Knowledge practice problems	Book: Technical Study Guide	2
<b>End of Section Exam (Following completion of classwork and homework)</b>			Hours	
1	1st Supportive Knowledge Practice Exam (7 Problems: Difficulty Level - Easy to Medium)		2	
2	2nd Supportive Knowledge Practice Exam (10 Problems: Difficulty Level - Medium to Hard)		1	
3	Check practice exam solutions	Solutions released after you submit your answers.	2	
<b>Total:</b>			<b>11.3</b>	
Section 11 - Review				
<b>Complete Final Exams</b>			Hours	
1	Complete HVAC PE Final Exam Part 1	Solutions released after you submit your answers.	2	
2	Complete HVAC PE Final Exam Part 2	Solutions released after you submit your answers.	2	
3	Complete HVAC PE Final Exam Part 3	Solutions released after you submit your answers.	2	
4	Complete HVAC PE Final Exam Part 4	Solutions released after you submit your answers.	2	
5	Review solutions		8	
<b>Total:</b>			<b>16</b>	