Los Angeles Trade-Technical College
Renewable Energy AS Degree
with Emphasis in Solar Thermal

PROGRAM DESCRIPTION
Los Angeles Trade-Technical College offers a series of courses for individuals interested in working in the new, emerging renewable energy and energy efficiency industry. This degree program includes courses that enable individuals to: (1) have the requisite knowledge and skills to obtain employment in the energy/utility sector, (2) be prepared to obtain solar thermal installation and maintenance entry-level occupations, and (3) obtain skills and expertise to pursue other renewable energy and/or energy efficiency occupations.

Requirements for the Renewable Energy Technical AS degree, with an emphasis in Solar Thermal Installation and Maintenance, may be satisfied by completing a minimum of 42 units in the required courses listed below and an additional 18 units in general education courses (Plan B). Upon successful completion of this program the student will have the necessary knowledge and skills for a career in residential and commercial solar thermal and renewable energy-related occupations.

PROGRAM REQUIREMENTS
In order to earn the Renewable Energy Technician AS degree, with an emphasis in Solar Thermal Installation and Maintenance, a student must complete the courses comprising the Solar Thermal Installation and Maintenance Technician Certificate of Achievement, courses comprising LATTC’s Energy Systems Fundamentals Certificate of Achievement, 18 units of general education courses from graduation plan B, and 14 or more units of Advanced Technical Requirements.

CORE SOLAR THERMAL INSTALLATION AND MAINTENANCE COURSES - 14 units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Lec</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRPNTRY 111A</td>
<td>Construction I</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>CRPNTRY 111B</td>
<td>Construction I</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>REF A/C 105</td>
<td>Solar Thermal Theory</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>REF A/C 110</td>
<td>Solar Thermal Practices</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>REF A/C 165</td>
<td>Thermal Heat Storage</td>
<td>4.5</td>
<td>4.5</td>
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<td>TOTAL CORE TECHNICAL UNITS/HRS</td>
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CORE SOLAR THERMAL INSTALLATION AND MAINTENANCE COURSES (Continued)

CRPNTRY 111A: Construction I (3)  
Lecture: 3 hours  
This course covers use and operation of hand tools, machine tools and portable electric tools commonly in use in construction. Fundamentals of residential foundation and wall construction, use of rough and finish hardware, glues and adhesives, federal, state and local building codes and safety ordinances are studied in this course.

CRPNTRY 111B: Construction I (2)  
Lab: 6 hours  
This course covers use and operation of hand tools, machine tools and portable electric tools commonly in use in construction. Fundamentals of residential foundation and wall construction, use of rough and finish hardware, glues and adhesives, federal, state and local building codes and safety ordinances are studied in this course.

REF A/C 105: Solar Thermal Theory (3)  
Lecture: 3 hours  
This course is designed for students interested in a career in the solar thermal industry. The fundamental principles and functions related to the solar thermal industry will be introduced. This course covers the theory, planning, installation, maintenance and necessary components for a solar thermal water system. The specifics for pools heating systems will also be reviewed. Basic heating, plumbing, and related concepts will also be covered.

REF A/C 110: Solar Thermal Practices (2)  
Lab: 6 hours  
This course is designed for students interested in a career in the solar thermal industry. The fundamental practices and functions of the solar thermal industry will be introduced. This course covers the skills and practices for planning, installation, and maintenance of all the necessary components for a solar thermal water system.

REF A/C 165: Thermal Heat Storage (4)  
Lecture: 1.5 hours  
Lab 4.5 hours  
Thermal energy storage and heat recovery principles of TES and basic definitions are the focus of study in this course. Load profile and electric cost are introduced and system design including space requirements and component election based on load profiles and costs are covered.

For Additional Information  ●  Workforce and Economic Development Office: 213-763-5534  
●  LATTC Green Workforce Website: [http://college.lattc.edu/green/](http://college.lattc.edu/green/)  
●  LATTC Green Educational Programs  
Website: [http://college.lattc.edu/green/education-training-programs/](http://college.lattc.edu/green/education-training-programs/)
CORE COURSES REQUIRED FOR ENERGY SYSTEMS TECHNOLOGY FUNDAMENTALS CERTIFICATE OF ACHIEVEMENT - 13 units

<table>
<thead>
<tr>
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<th>Title</th>
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<th>Lab</th>
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<tbody>
<tr>
<td>ECONMT 100</td>
<td>(OSHA) Safety Standards: Construction &amp; Industry</td>
<td>2</td>
<td>2</td>
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<tr>
<td>BLDGCTQ 10</td>
<td>Energy &amp; Utility Industry Careers</td>
<td>3</td>
<td>3</td>
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</tr>
<tr>
<td>ECONMT 115</td>
<td>Fundamentals of D.C. Electricity</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>ECONMT 116</td>
<td>Hand Tools &amp; Wiring Practices</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>ECONMT 129</td>
<td>Fundamentals of Alternative Current</td>
<td>3</td>
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<td>TOTAL CORE TECHNICAL UNITS/HRS</td>
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ECONMT 100: (OSHA) Safety Standards: Construction and Industry (2)
Lecture: 2 hours
This course provides instruction on industry safety and health rules as it applies to workers and employers within the construction industry. Topics such as fall protection, lock out tag out procedures, PPE, excavations, etc. are covered. Participants that meet the required hourly attendance and successfully pass the final exam will be eligible to receive their OSHA (30 hr) safety-training certificate.

BLDGCTQ 10: Energy and Utility Industry Careers (3)
Lecture: 3 hours
This course reviews high demand jobs in the energy and utility industry and assists students in deciding on an appropriate career path. Hiring process and interview skills will be explored and fitness for duty and other physical and physiological characteristics will be discussed. An A to Z guide to private, State, Federal, and international career opportunities will be presented.

ECONMT 115: Fundamentals of D.C. Electricity (3)
Lecture: 3 hours
The basic principles of D.C. electricity. Analyzing series, parallel and complex circuits, using Ohm’s law, the power equation, and Kirchoff’s laws.

ECONMT 116: Hand Tools and Wiring Practices (2)
Lab: 6 hours
This course covers the proper use of tools, conductor identification and selection criteria, and industry standards for splicing and termination of conductors. An introduction to various codes and related publications will also be included.

ECONMT 129: Fundamentals of Alternative Current (3)
Lecture: 3 hours
This course focuses on the generation of electrical sine waves and response of various circuits when A.C. is applied. Mathematical analyses of resistive circuits are studied.

MATH COURSE REQUIRED FOR ENERGY SYSTEMS TECHNOLOGY FUNDAMENTALS CERTIFICATE OF ACHIEVEMENT - 3-5 units (one course from the following)

Math course required for Energy System Technology Fundamentals Certificate of Achievement – 3-5 from the following
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Lec</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECONMT 119</td>
<td>Applied Electrical Calculations &amp; Measurement</td>
<td>3</td>
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<tr>
<td>ECONMT 173</td>
<td>Electrical Mathematics I</td>
<td>3</td>
<td>3</td>
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<tr>
<td>MATH 115 or Higher</td>
<td>Elementary Algebra</td>
<td>5</td>
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<td></td>
<td>TOTAL MATH UNITS/HRS</td>
<td>3-5</td>
<td>2-5</td>
<td>0</td>
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</tbody>
</table>

ECONMT 119: Applied Electrical Calculations and Measurement (3)
Lecture: 3 hours
This is an entry-level course in electrical calculations with special emphasis on the application problems encountered in the construction industry.

OR

ECONMT 173: Electrical Mathematics I (3)
Lecture: 3 hours
This course studies the mathematics of varied problems encountered in the electrical trades. The course reviews prime numbers, fractions, and decimals, powers, signed numbers, algebraic and simultaneous equations and applications involving electrical formulae.

OR

MATH 115 or Higher: Elementary Algebra (5)
Lecture: 5 hours
Topics include signed numbers, variables, the order of operations; addition, subtraction, multiplication and division of signed numbers and polynomials. Solve linear equations, inequalities; factor, graph. Solve word problems, systems of equations, rational equations, radicals and quadratic equations.

ADVANCED TECHNICAL REQUIREMENTS – 14+ units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
<th>Lec</th>
<th>Lab</th>
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<tr>
<td>ECONMT 110</td>
<td>Renewable Energy Systems</td>
<td>3</td>
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<tr>
<td>CRPNTRY 148</td>
<td>Computer Assisted Estimating</td>
<td>3</td>
<td>1.5</td>
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<tr>
<td>REF A/C 100</td>
<td>Project Management</td>
<td>3</td>
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<tr>
<td>Course Option – 3 units</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECONMT 171</td>
<td>Electrical Codes &amp; Ordinances</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>PLUMBNG 28</td>
<td>Plumbing Code I</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Other technical Requirements – 1 or more courses from the following list of courses to reach 60 or more units</td>
<td></td>
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<tr>
<td>ECONMT 105</td>
<td>Fundamentals of Solar Electricity</td>
<td>3</td>
<td>3</td>
<td>0</td>
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<tr>
<td>ECONMT 205</td>
<td>Fundamentals of Solar Electricity</td>
<td>2</td>
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<td>6</td>
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<tr>
<td>BLDGCTQ 007</td>
<td>Weatherization – Practical Energy Efficiency Techniques</td>
<td>3</td>
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<tr>
<td>BLDGCTQ 008</td>
<td>Weatherization – Energy Efficiency Practices</td>
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<tr>
<td>BLDGCTQ 009</td>
<td>Energy Auditor – Residential</td>
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<tr>
<td>BLDGCTQ 012</td>
<td>Energy Auditor – Residential Practices</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
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● LATTC Green Educational Programs
Website: http://college.lattc.edu/green/education-training-programs/
ECONMT 110: Renewable Energy Systems (3)  
Lecture: 3 hours  
This course will cover energy basics, solar basics; active and passive solar, solar-thermal, solar-electric, wind, water; hydropower, wave and tidal power, bio-fuel and biomass resources, geothermal power, energy storage, and hydrogen fuel cells. Both large and small scale, grid interactive and stand alone systems will be discussed. Energy collection, site evaluation, design analysis of various systems, material use, and methods of construction ("green building") will also be covered, along with overviews of California and US energy policy and global energy use. This course is designed for students interested in a career in the solar industry.

CRPNTRY 148: Computer Assisted Estimating I (3)  
Lecture: 1.5 hours  
Lab: 4.5 hours  
Instruction is given in the use of a personal computer to make 2D and 3D design drawings, with an emphasis on conforming to the Uniform Building Code and producing a materials list.

REF A/C 100: Project Management (3)  
Lecture: 3 hours  
This course provides HVAC Industry Project Manager instruction. Topics covered will include blueprint reading, Microsoft spreadsheets, Microsoft Word documents, Microsoft Project, design build criteria, estimating, change orders, request for information, GANTT Charts, scheduling, schedule of values, purchase orders, submittals, transmittals, reading of air balance reports, warranty letters and close out packages.

CODE COURSE OPTION – 3 units

ECONMT 171: Electrical Codes and Ordinances (3)  
Lecture: 3 hours  
Basic electrical codes and ordinances are the focus of this course. General codes, wiring methods and fittings, and circuit requirements specified in the various ordinances are reviewed.

OR

PLUMBNG 28: Plumbing Code I (3)  
Lecture: 3 hours  
Instruction is given in plumbing codes and ordinances that affect rough-in work, in city and county areas. Installation of wastes, vents, cleanouts, traps, gas fittings and gas vents, and water pipe requirements are reviewed.

OTHER TECHNICAL REQUIREMENTS – 1 or more courses from the following list of courses to reach 60 or more units:

ECONMT 105: Fundamentals of Solar Electricity (3)  
Lecture: 3 hours  
This course is designed for students interested in a career in the solar industry. The fundamental principles and functions of photo voltaic industry will be introduced. This course covers planning, installation, maintenance and all the necessary components for a photo voltaic system. The transmission and distribution of electric power will be reviewed. Basic concepts of electricity, identification, functions and operations of components will be surveyed.

ECONMT 205: Fundamentals of Solar Electricity (2)  
Lab: 6 hours  
This course is designed for individuals that have the basic electrical and mechanical skills of an energy technician or electrician and are looking to expand into the renewable energy field. This is a hands on class to develop the fundamental principles and practices for installation and maintenance of solar, wind, and similar renewable energy systems. This course covers basic planning, installation, and maintenance of the necessary components for various renewable energy systems.

BLDGCTQ 007: Weatherization – Practical Energy Efficiency Techniques (3)  
Lecture: 3 hours  
This course provides expertise advice on various techniques that can be used to weatherize homes and other structures. The course is suitable for application by a professional home or energy inspector. Homeowners would also benefit from the knowledge and application of the simpler techniques. Efficiency techniques related to: Energy basics, sealing, insulating, window replacement/installation, environmental air, water, appliance energy efficiency, and lighting are just some of the areas that will be covered.

BLDGCTQ 008: Weatherization – Energy Efficiency Practices (1)  
Lab: 3 hours  
This course provides laboratory exercises to build skills necessary for the effective application of energy techniques that can be used to weatherize homes and other structures. Course is suitable for application by a professional weatherization contractor training entry level workers or a homeowner looking to improve their own home. Efficiency practices related to: Energy basics, sealing, insulating, window replacement/installation, environmental air, water, appliance energy efficiency, and lighting are just some of the areas that will be covered.

BLDGCTQ 009: Energy Auditor – Residential (3)  
Lecture: 3 hours  
A course focusing on residential energy requirements, loss and efficiency. How energy is used and lost will be discussed, along with the testing techniques and approaches to measure the amount of energy lost. Students will learn the components of an energy audit report and complete necessary forms.

BLDGCTQ 012: Energy Auditor – Residential Practices (1)  
Lab: 3 hours  
A course focusing on the practical application of residential energy requirements, loss and efficiency. Testing techniques and measurement the amount of energy lost. Students will perform actual energy audits of simulated structures and complete necessary forms.

PROGRAM CONTACT INFORMATION

Department Chair: William Elarton  
Division: Construction, Design, and Manufacturing  
Ph: 213.763.3701  
Email: ElartoWD@lattc.edu  
Website: http://college.lattc.edu/cdm/