

## MODULE ENM3090: ENERGY DESIGNS/SYSTEMS 2 (PRACTICAL APPLICATIONS)

**Level:** Advanced

**Theme:** Management and Conservation

**Prerequisite:** ENM2090 Energy Designs/Systems 1 (Basic Principles)

**Module Description:** Students analyze energy-saving technologies and systems and design a residential/commercial structure or transportation technology that demonstrates the principles of energy conservation and efficiency.

**Module Parameters:** Access to a construction, fabrication, mechanics or science laboratory.

### Curriculum and Assessment Standards

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"><li>describe energy use within a residential/commercial environment or transportation sector</li></ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"><li>conducting an energy audit within a residential/commercial environment or transportation sector. Audit to include:<ul style="list-style-type: none"><li>an inventory/review of past and present energy use</li><li>the establishment of acceptable goals for energy efficiency and consumption</li><li>proposed strategies for achieving energy-use goals.</li></ul></li></ul> <p><i>Assessment Tool</i> <i>Task Checklist: Energy Audit, ENM3090-1</i></p> <p><i>Standard</i> <i>Complete the energy audit to a standard of 3 on the rating scale</i></p>	40

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(continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• design a residential/commercial structure or transportation technology that uses energy conservation and efficiency</li> <li>• explain career opportunities relevant to energy design and technology</li> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• given a problem in energy design, constructing a drawing/model of a residential/commercial structure or transportation technology that addresses the problem. The drawing/model must illustrate:                             <ul style="list-style-type: none"> <li>– a clear response to the design problem</li> <li>– component parts and processes</li> <li>– efficient use of energy and other resources</li> <li>– regard for human and environmental safety.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Project Assessment: Technology Design, ENMTEC</i>  <i>Assessment Criteria: Diagrams and Technical Drawings, ENMDRA</i></p> <p><i>Standard</i>  <i>Complete the design <u>and</u> drawing/model to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• completing a research project on one or more career opportunities in energy design.</li> </ul> <p><i>Assessment Tool</i>  <i>Career Search: Advanced Level, ENMCAR-3</i></p> <p><i>Standard</i>  <i>Conduct research to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <p><i>Assessment Tool</i>  <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>50</p> <p>10</p> <p>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
Energy Analysis	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• conduct an inventory of energy use within a residential/commercial environment or transportation sector</li> </ul>	Ask local utility companies about energy analysis in residential/commercial environments.

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(continued)

Concept	Specific Learner Expectations	Notes
Energy Analysis (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• analyze energy efficiency within the residential/commercial environment or transportation sector</li> <li>• establish a target level of energy efficiency and determine potential savings that may result from achieving this target</li> <li>• research technologies and/or strategies that can be used to achieve the target level of energy efficiency.</li> </ul>	<p>If analyzing energy use in the transportation sector, refer to <i>Wise Use of Petroleum Resources: The Car in Our Daily Lives</i> (see Section I: Learning Resource Guide).</p> <p>Plan for:</p> <ul style="list-style-type: none"> <li>• discussion and debate</li> <li>• personal action plans.</li> </ul> <p>Contact resource persons from the residential, commercial or transportation sector.</p>
Low Energy Designs and Systems	<ul style="list-style-type: none"> <li>• identify an energy design problem relevant to a residential/commercial structure or transportation technology</li> <li>• research design technologies available to respond to the situation</li> <li>• identify limitations present in the design problem</li> <li>• examine similar structures or technologies that incorporate energy efficient design suitable for the context</li> <li>• generate alternatives regarding the design, select the most appropriate alternative, and plan a sequence of tasks to create the structure or technology</li> <li>• make/model a structure or technology by following plans that have been established</li> </ul>	<p>Consider design problems and solutions that address:</p> <ul style="list-style-type: none"> <li>• size and/or weight</li> <li>• topographic and/or climatic factors</li> <li>• energy transfer and/or conversion</li> <li>• comfort and practical use</li> <li>• cost limitations.</li> </ul> <p>Approach problems from a historical perspective (e.g., 1980s energy crisis and the development of the fuel injector).</p> <p>Talk to others to clarify ideas. Consider similar problems and how they were solved. Make reasoned judgements regarding design potential.</p> <p>Plan for:</p> <ul style="list-style-type: none"> <li>• drawing/designing</li> <li>• constructing models.</li> </ul>

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(continued)

Concept	Specific Learner Expectations	Notes
<p>Low Energy Designs and Systems (continued)</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• evaluate the strengths and limitations of the energy design, and consider alternatives that may improve the process and/or outcomes.</li> </ul>	<p>Assess the design in relation to:</p> <ul style="list-style-type: none"> <li>• original needs and intentions</li> <li>• efficient use of resources</li> <li>• human and environmental safety.</li> </ul>
<p>Career Opportunities</p>	<ul style="list-style-type: none"> <li>• research careers and the range of occupational opportunities in low energy design and technology; e.g.: <ul style="list-style-type: none"> <li>– engineering</li> <li>– technical and support services</li> <li>– environmental management</li> </ul> </li>   <li>• infer career opportunities and trends from employment statistics</li>   <li>• research trends in low energy designs and systems, and resulting career opportunities.</li> </ul>	<p>Plan for individual/group research and presentations that address:</p> <ul style="list-style-type: none"> <li>• job description</li> <li>• employment market</li> <li>• education/training</li> <li>• wage expectations.</li> </ul> <p>Contact the “Career Information Hotline” (Alberta Advanced Education and Career Development).</p> <p>See the National Occupational Profiles (NOC) in Section H: Linkages/Transitions.</p> <p>Arrange/facilitate:</p> <ul style="list-style-type: none"> <li>• information interviews</li> <li>• work study/experience</li> <li>• job shadowing.</li> </ul>