

COURSE CURRICULUM AND ASSESSMENT STANDARDS:

SECTION F: ADVANCED LEVEL

The following pages define the curriculum and assessment standards for the advanced level of Forestry.

Advanced level courses demand a higher level of expertise and help prepare students for entry into the workplace or a related post-secondary program.

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COURSE FOR3010: ISSUES IN FORESTRY**Level:** Advanced**Theme:** Social and Cultural Perspectives**Prerequisite:** None**Description:** Students analyze current local and global issues in forest management, and demonstrate individual and shared actions that foster environmental stewardship.**Parameters:** Access to information available from government, industry and community organizations (e.g., special-interest groups) regarding current forestry issues.**Curriculum and Assessment Standards**

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe alternatives and consequences associated with current issues in forest management 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> for each of <u>five</u> current issues in forest management, identifying and explaining three or more: <ul style="list-style-type: none"> – immediate and/or long-term consequences – possible alternatives for dealing with the issue. <p>Consequences and alternatives to address social, economic and environmental perspectives.</p> <p><i>Assessment Tool</i> <i>Issues in Forestry: Analyzing Issues, FOR3010–1</i> <i>Assessment Framework: Issue Analysis, CTSISS</i></p> <p><i>Standard</i> <i>Analyze five issues to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> a critique of one newspaper/magazine article or video documentary regarding an issue in forest management. Critique to address: <ul style="list-style-type: none"> – range of viewpoints/biases evident – validity/reliability of information presented – recommended course of action. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010–1</i> <i>Guide to Critiquing Media Information, FORMED</i></p> <p><i>Standard</i> <i>Critique one piece of media information to a standard of 3 on the rating scale</i></p>	30

COURSE FOR3010: ISSUES IN FORESTRY (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • compare and contrast issues and trends involving Canada’s forests with similar issues and trends in other parts of the world • demonstrate individual and shared actions that foster the sustainable management of forested regions 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • completing a research project on an international forest issue. Research to provide: <ul style="list-style-type: none"> – an explanation of the issue, including the stakeholders involved and their respective points of view – positive and negative consequences for the forest resource and society – a comparison of the issue with a similar forest issue in Canada – suggested strategies/actions for dealing with the issue at local and global levels. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010–1</i> <i>Assessment Framework: Research Process, CTSRES</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	<p>30</p>
	<ul style="list-style-type: none"> • providing a summary of the goals and accomplishments of one environmental conservation group. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010–1</i></p> <p><i>Standard</i> <i>Summarize goals/accomplishments to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> • given a current issue in forest management: <ul style="list-style-type: none"> – negotiating and debating the issue while assuming the role of one or more stakeholder groups – through group consensus building, developing and presenting a shared agreement on a preferred course of action for dealing with the issue. <p><i>Assessment Tool</i> <i>Issues in Forestry, FOR3010–1</i> <i>Negotiation and Debate: Advanced Level, FORNEG–3</i></p> <p><i>Standard</i> <i>Negotiate and present and shared agreement to a standard of 3 on the rating scale</i></p>	<p>40</p>

COURSE FOR3010: ISSUES IN FORESTRY (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Outcomes	Notes
<p>Issues Involve Alternatives</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> describe past and present trends in the consumptive and non-consumptive use of forests analyze differing points of view regarding how and to what degree Canada's forests should be used identify positive and negative effects of forest industry development on people, industry and the environment describe and assess the pros and cons of different forest harvesting practices; e.g.: <ul style="list-style-type: none"> clearcutting selective harvesting describe issues related to the expansion and management of Alberta's forest industry; e.g.: <ul style="list-style-type: none"> access management herbicide use in timber management old-growth management maintenance of biodiversity describe ways in which different forest stakeholders make use of the judicial, legislative and regulatory systems in working toward their objectives. 	<p>Gather appropriate resource materials <u>prior</u> to beginning the course.</p> <p>Discuss issues from a variety of perspectives; e.g., social, economic, environmental.</p> <p>Discuss different perspectives regarding how and to what degree Canada's forests should be used.</p> <p>Analyze pros and cons related to different forest harvest practices.</p> <p>Identify issues regarding the expansion of forest management in Alberta.</p>

COURSE FOR3010: ISSUES IN FORESTRY (continued)

Concept	Specific Outcomes	Notes
Global Issues and Trends	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • compare issues involving Canada’s forests with similar issues in other parts of the world; e.g.: <ul style="list-style-type: none"> – land use – expansion of the forest industry – forest renewal processes – management of old-growth forests – climate change and forest ecosystems – extensive versus intensive management • describe global impacts of the recreational and commercial use of forests; e.g.: <ul style="list-style-type: none"> – social and cultural – economic – environmental • infer the long-range effects of the sustainable use of forests in Canada and other parts of the world. 	<p>Research a forest issue of significance in another country. Compare and contrast with the Canadian situation.</p>
Individual and Shared Actions	<ul style="list-style-type: none"> • compare and contrast different philosophies, ethics and alternatives regarding the forest resource and how best to ensure its health and sustainability • describe the goals and objectives of one or more forest conservation or preservation groups • explain a global issue regarding the consumptive and/or non-consumptive use of forests; e.g.: <ul style="list-style-type: none"> – conduct research – develop a position – participate in debate • identify a plan for the use of a forested region; e.g.: <ul style="list-style-type: none"> – conduct research – generate alternatives – agree to a plan that meets an acceptable level of needs • initiate responsible and ethical actions in relation to the forest and its many resources; e.g.: <ul style="list-style-type: none"> – individual actions – shared actions – leadership roles. 	<p>See <i>Alberta’s Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 3.6–An Urban Wilderness at School • Activity 5.1–Forest Values • Activity 5.3–Forest Perspectives. <p>Plan learning activities that emphasize and develop strategies for <u>empowerment</u>.</p>

COURSE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS)**Level:** Advanced**Theme:** Technology and Applications**Prerequisite:** FOR2060 Measuring the Forest 2 (Sampling Techniques)**Description:** Students explain management applications of data collected from a forest survey, and examine the role of technology in current forest inventory practices.**Parameters:** Access to forest inventory technology and forest survey data available from government and industry organizations; e.g., Alberta Environmental Protection, Canadian Forestry Service, Canadian Centre for Remote Sensing.

Access to forestry maps available from private vendors.

Instructor knowledge of population sampling and survey design and/or relevant industry experience is an asset.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> explain the applications of forest survey data in resource management 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> identifying and explaining applications of timber cruise data and nonfibre data in resource management. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Survey Data, FOR3060–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> demonstrating applications of a sample set of forest survey data by: <ul style="list-style-type: none"> identifying bias, error and other limitations in the sample data extrapolating the data to estimate forest populations using the survey data to establish effective forest management practices modifying the sample design to increase accuracy of the survey. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Survey Data, FOR3060–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	60

COURSE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>Integrated throughout</p>

Concept	Specific Outcomes	Notes
<p>Data Interpretation</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> explain applications of timber cruise data in resource management; e.g.: <ul style="list-style-type: none"> estimating total fibre volume projecting future forest growth planning harvest operations explain applications of nonfibre data in resource management; e.g.: <ul style="list-style-type: none"> monitoring water and soil quality determining potential for agriculture/recreation monitoring wildlife population densities and trends planning conservation practices interpret a set of sample forest survey data; e.g.: <ul style="list-style-type: none"> consider bias, error and other limitations in the sample data extrapolate the data to estimate forest populations suggest applications of data in resource management consider modification to sample design that may increase accuracy of the survey. 	<p>Contact resource persons from:</p> <ul style="list-style-type: none"> Canadian Forestry Service (Natural Resources Canada) Land and Forest Services (Alberta Environmental Protection). <p>Perform mathematical calculations to determine timber volumes.</p> <p>Obtain sample data from local government/industry.</p> <p>Use paper and pencil <u>OR</u> computer programs to interpret data.</p> <p>Supplementary sources of information on forest measurement include:</p> <ul style="list-style-type: none"> <i>Natural Resources Measurements</i> by Thomas Avery (McGraw Hill Book Co., 1975) <i>Forest Mensuration</i> (3rd Edition) by Bertram Husch, Charles Miller and Thomas Beers (John Wiley and Sons Inc., 1982).

COURSE FOR3060: MEASURING THE FOREST 3 (SURVEY APPLICATIONS) (continued)

Concept	Specific Outcomes	Notes
<p>Role of Technology</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe applications of technology in gathering and storing data about the forest resource; e.g.: <ul style="list-style-type: none"> – aerial photography – satellite imagery – computer-based mapping systems • explain the importance of ground truthing in verifying data gathered through remote sensing • predict forest inventory technologies and practices in the future • outline the objectives of a current forest inventory research project; e.g.: <ul style="list-style-type: none"> – an initiative of the Canadian Forestry Service – an Alberta Research Council project. 	<p>Acquaint students with current applications of technology through field studies.</p> <p>Contact the following agencies for information on current information-gathering technologies:</p> <ul style="list-style-type: none"> • <i>Canadian Centre for Remote Sensing</i> (Ottawa, Ontario) • <i>RADARSAT International</i> (Richmond, BC). <p>Research the future use of computers and recent developments in Geographic Information Systems (GIS).</p> <p>Investigate potential applications of Global Positioning Systems (GPS).</p>
<p>Career Opportunities</p>	<ul style="list-style-type: none"> • outline potential careers and the range of occupational opportunities in forest measurement • summarize and present the results of research on one or more career opportunities in forest measurement; e.g.: <ul style="list-style-type: none"> – nature of the work – number of workers/employment trends – entry requirements/competencies – education/training opportunities – opportunity for advancement. 	<p>Review National Occupational Profiles (NOC).</p> <p>Interview persons involved in conducting forest inventories.</p> <p>Provide opportunities for work experience and job shadowing.</p>

COURSE FOR3070: THE FOREST MARKETPLACE

Level: Advanced

Theme: Technology and Applications

Prerequisite: None

Description: Students describe the range of consumer products and services derived from Canada’s forests, and research the production and marketing of these forest products.

Parameters: Access to resources available from forest products and forest service industries.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • describe fibre and nonfibre products and services derived from Canada’s forests • explain processes used in developing fibre and nonfibre forest products and services in Canada and Alberta 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • given a range of relevant in-school/community resources, identifying and describing: <ul style="list-style-type: none"> – fibre and nonfibre products and services derived from Alberta’s forests – forecasts regarding the future use of forests in Alberta and Canada. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Products and Services, FOR3070–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> • preparing flow charts that depict the sequence of steps involved in developing three forest products and/or services. <p><i>Assessment Tool</i> <i>Assessment Criteria: Flow Charts, FORFLO</i></p> <p><i>Standard</i> <i>Complete flow charts to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> • completing a research project on recent applications of milling and/or pulping technology in the development of one or more forest products/services. <p><i>Assessment Tool</i> <i>Research Process: Milling and/or Pulping Technology, FOR3070–2</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p>	<p>10</p> <p>30</p>

COURSE FOR3070: THE FOREST MARKETPLACE (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • identify market trends, and develop a marketing plan for a forest product or service • explain career opportunities relevant to developing and marketing forest products • demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • developing and presenting a multimedia marketing plan for a new forest product or service. Plan to involve consideration of: <ul style="list-style-type: none"> – factors that influence market trends – product diversification and/or specialization – potential markets in North America, the Pacific Rim, Europe and two other selected regions – materials and processes involved in product/service development – effective marketing strategies and systems. <p><i>Assessment Tool</i> <i>Assessment Criteria: A Marketing Plan, FOR3070–3</i></p> <p><i>Standard</i> <i>Develop and present the marketing plan to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> • given current information on career opportunities in developing and marketing forest products (e.g., labourer, technician, professional worker), completing a research project on one or more related careers. <p><i>Assessment Tool</i> <i>Career Search: Advanced Level, FORCAR–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"> • observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tools</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>50</p> <p>10</p> <p>Integrated throughout</p>

COURSE FOR3070: THE FOREST MARKETPLACE (continued)

Concept	Specific Outcomes	Notes
<p>Products and Services</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify market-based products and services derived from Alberta’s forests; e.g.: <ul style="list-style-type: none"> – primary wood products – wood-fabricated materials – wood pulp and paper products – chemical products – trapping, fishing and hunting – guiding and outfitting – tourism and recreational pursuits • identify psychological benefits and extra-market values derived from Alberta’s forests; e.g.: <ul style="list-style-type: none"> – ecological values – aesthetic and spiritual values – bequest value for future generations • describe trends in the consumptive and non-consumptive use of forests in Canada and Alberta; e.g.: <ul style="list-style-type: none"> – recreation – trapping – logging – oil and gas development. 	<p>Contact the Alberta Forest Products Association for current resources and information.</p> <p>See <i>Alberta’s Focus on Forests</i> (Activity 4.2–Products From Canada’s Forests).</p> <p>Identify major industries that require wood.</p> <p>Identify common products derived from a selected tree species.</p> <p>Identify a range of forest products and services that could be derived from a selected site.</p> <p>Supplementary sources of information include:</p> <ul style="list-style-type: none"> • <i>A Forest Journey - The Role of Wood in the Development of Civilization</i> (Harvard University Press) • <i>Canadian Forestry - The View Beyond the Trees</i> (Macmillan of Canada).
<p>Processing</p>	<ul style="list-style-type: none"> • identify and sequence the steps that are involved in producing a fibre commodity; e.g.: <ul style="list-style-type: none"> – harvest and transportation – processing techniques – grading, packing and storage • identify materials and services that are required at each stage in the production of a fibre commodity; e.g.: <ul style="list-style-type: none"> – human and natural resources – energy and technologies – inspection and regulation 	<p>See <i>Alberta’s Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 4.4–From Pulp to Paper and Back Again • Activity 4.5–Pulp and Paper: The Technology–Environment Connection. <p>Draw posters that depict the journey of a tree from stump to consumer.</p>

COURSE FOR3070: THE FOREST MARKETPLACE (continued)

Concept	Specific Outcomes	Notes
Processing (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe recent developments in milling and pulping technology and their impact on the forest industry; e.g.: <ul style="list-style-type: none"> – fibre utilization – environmental stewardship • identify new and emerging products and services derived from Alberta’s forests; e.g.: <ul style="list-style-type: none"> – cattle food – methane gas. 	
Marketing Systems and Trends	<ul style="list-style-type: none"> • describe the nature and extent of Canada's market share in North America, the Pacific Rim, Europe and other locations • describe systems used to market Canada’s forest products and services at local, national and international levels • identify social, economic and environmental factors that influence consumer trends and market demands for forest products and services • describe the impact of developing technologies on Canada’s fibre and nonfibre forest products; e.g.: <ul style="list-style-type: none"> – efficiency of production processes – improved utilization – focus on value-added and knowledge intensive commodities • identify market opportunities that arise from product diversification and specialization, international trade and participation in a global economy • create a plan for identifying new market opportunities, developing a forest product, and managing the venture. 	<p>Marketing courses in the Agriculture strand and Management and Marketing strand offer additional instructional strategies.</p> <p>View <i>Dr. Suess: The Lorax</i>, a video that addresses environmental issues in marketing (available from the National Film Board or your local Urban/Regional Resource Centre).</p> <p>Visit a sawmill and wood-product distributor to examine traditional and new uses of wood.</p> <p>Prepare a venture plan for Christmas tree production and marketing.</p>

COURSE FOR3070: THE FOREST MARKETPLACE (continued)

Concept	Specific Outcomes	Notes
Career Opportunities	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • outline potential careers and the range of occupational opportunities in developing and marketing forest products • present the results of research on one or more careers involving the production and/or marketing of forest products; e.g.: <ul style="list-style-type: none"> – nature of the work – number of workers/employment trends – entry requirements/competencies – education/training opportunities – opportunity for advancement. 	<p>Review National Occupational Profiles (NOC).</p> <p>Interview persons involved in the production and marketing of forest products.</p> <p>Provide opportunities for work experience and job shadowing.</p>

COURSE FOR3080: FOREST TECHNOLOGY APPLICATIONS

Level:	Advanced
Theme:	Technology and Applications
Prerequisite:	None
Description:	Students examine research and technological applications in the forest industry, and examine changing career opportunities in the forestry sector.

Parameters: Access to resources available from relevant industry and government organizations; e.g., Alberta Environmental Protection, Canadian Forestry Service, Alberta Research Council.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe different areas of forest research presently being conducted in Canada and Alberta 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> identifying major areas of forest research being conducted in Canada and, where possible, Alberta. <p><i>Assessment Tool</i> <i>Forest Technology Applications, FOR3080-1</i></p> <p><i>Standard</i> <i>Identify six major areas of forest research to a standard of 3 on the rating scale</i> given information regarding a current forest research project in Canada (e.g., enhanced utilization, forest management), summarizing: <ul style="list-style-type: none"> research objectives and participating agencies information-gathering strategies project status and implications for forest industry. <p><i>Assessment Tool</i> <i>Forest Technology Applications, FOR3080-1</i> <i>Presentations/Reports, FORPRE-3</i></p> <p><i>Standard</i> <i>Summarize <u>one</u> current forest research project to a standard of 3 on the rating scale</i></p> </p>	30

COURSE FOR3080: FOREST TECHNOLOGY APPLICATIONS (continued)

Concept	Specific Outcomes	Notes
Research	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify and describe different areas of forest research being conducted in Canada and Alberta; e.g.: <ul style="list-style-type: none"> – silviculture – harvesting systems – forest products – forest protection – wildlife inventories – ecological studies – integrated resource management • compare the goals and priorities of local agencies whose mandate is to conduct research related to forestry and forest ecosystems; e.g.: <ul style="list-style-type: none"> – individuals – corporations – colleges and universities – government agencies • explain the role of the Alberta Forest Research Advisory Council in coordinating forest research activities in Alberta • describe applications of data banks and information systems in making forest management decisions • identify major components of a research plan for the enhanced utilization and/or management of forests; e.g.: <ul style="list-style-type: none"> – goals and objectives of the plan – economic, political, scientific and related factors – methodologies and strategies – outcomes and types/kinds of data obtained – limitations of the plan, or information that may be lacking or incomplete. 	<p>Contact the Canadian Forestry Service (Natural Resources Canada) for current information (see Section I: Learning Resource Guide).</p>
Technologies	<ul style="list-style-type: none"> • describe past and present applications of technology in the forest industry; e.g.: <ul style="list-style-type: none"> – greenhouse and nursery operations – silviculture – harvesting technologies – wood production and utilization – biotechnology 	

COURSE FOR3080: FOREST TECHNOLOGY APPLICATIONS (continued)

Concept	Specific Outcomes	Notes
Technologies (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe emerging applications of technology in the forest industry; e.g.: <ul style="list-style-type: none"> – pulping procedures – effluent treatment and pollution control • describe the advantages and disadvantages of a recent technology designed to enhance our utilization and/or management of forests; e.g.: <ul style="list-style-type: none"> – social – economic – environmental. 	
Career Trends	<ul style="list-style-type: none"> • predict ways in which research, technology, social values and land use priorities may affect forest industries in the future • predict future careers and occupational opportunities within the forestry sector, and the education/training that may be required to gain employment and advance in related fields • describe general career areas and the range of occupational opportunities available within each; e.g.: <ul style="list-style-type: none"> – forest inventory – forest biology/ecology – forest protection – forest harvest – forest products industry – forest management • describe one or more employment opportunities in forestry; e.g.: <ul style="list-style-type: none"> – job description/working conditions – entry requirements/competencies – educational/training opportunities – opportunity for advancement – opportunity for self-employment and entrepreneurship. 	<p>Review National Occupational Profiles (NOC).</p> <p>Contact the “Career Hotline” (telephone 1-800-661-3753).</p> <p>Interview persons employed in the forestry sector.</p>

COURSE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION)**Level:** Advanced**Theme:** Management and Conservation**Prerequisites:** FOR1090 Forest Ecology 1 (Ecosystem Dynamics) or Biology 20
Emergency First Aid (current certification)**Description:** Students investigate the interrelationships among soil, water, air, trees and the environment, and explain how forests change over time as a result of these interrelationships.**Parameters:** Access to a forest environment.

Instructor training (current certification) in Standard Level First Aid is required.

See Section C (Planning for Instruction) and Section H (Linkages/Transitions) for further information on instructor training and certification.

Supporting Courses: AGR2120 and AGR3120 Soils Management 1 and 2

Students must have a general knowledge of basic first aid and survival techniques relevant to a forest environment prior to engaging in field-based investigations. See Planning for Instruction in Section C for further information on student safety.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> explain the effects of soil, air and water characteristics on forest ecosystems 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> identifying and describing: <ul style="list-style-type: none"> organic and inorganic components of forest soils and their function in forest ecosystems major types of air pollutants and their affect on forest ecosystems. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Soil, Air and Water Characteristics, FOR3090–1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	40

COURSE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • identify factors that determine the presence of tree species and forest ecosystems in particular environments 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • conducting field investigations on the effects of soil pH, temperature and water quantity on plant growth. <i>Assessment Tool</i> <i>Field Investigations: Soil, Air and Water Characteristics, FOR3090-2</i> <i>Standard</i> <i>Conduct field investigation to a standard of 3 on the rating scale</i> • describing causal relationships and making inferences regarding the effects of: <ul style="list-style-type: none"> – local forests on soil, water, weather and biotic factors – global forests on global climate. <i>Assessment Tool</i> <i>Guide to Inferences: Forest Ecosystems, FOR3090-3</i> <i>Standard</i> <i>Make <u>ten</u> inferences (as outlined in FOR309-3) to a standard of 3 on the rating scale</i> • completing a field-based research project on forest associations. Research to include: <ul style="list-style-type: none"> – the silvics of five common Alberta tree species, including climatic, soil and moisture requirements – the structural characteristics and environments of three common Alberta forest associations, and factors that have determined their existence. <i>Assessment Tools</i> <i>Research Process: Forest Associations, FOR3090-4</i> <i>Alberta’s Focus on Forests (Section 3.1: A Lot Depends on Location)</i> <i>Common Forest Associations in Alberta, FOR3090-5</i> <i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i> 	<p>30</p>

COURSE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

Concept	Specific Outcomes	Notes
Forest Ecosystems	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • describe physical characteristics used to classify forest soils, and the effect of different soils on plant growth; e.g.: <ul style="list-style-type: none"> – texture – porosity • explain the function of organic and inorganic components of forest soils; e.g.: <ul style="list-style-type: none"> – micro- and macro-organisms – gases and minerals – organic matter – water • describe the effects of soil acidity, alkalinity and temperature on the growth of trees and other forest plants • describe indicators of water quantity in the forest, and its effects on trees and other plants; e.g.: <ul style="list-style-type: none"> – surface water – ground water • describe the effects of known air pollutants on forest ecosystems; e.g.: <ul style="list-style-type: none"> – ozone – particulate matter – oxides and nitrogen – sulphur dioxide • describe the effects of a forest on the local environment; e.g.: <ul style="list-style-type: none"> – soil and water – weather – wildlife • infer the effects of forests worldwide on global climates. 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 1.4–How Forests Affect the Environment • Activity 1.5–Biosphere. <p>Investigate soil characteristics by digging a soil pit.</p> <p>Analyze soil samples using a soil test kit.</p> <p>Design and perform experiments that monitor the effects of soil composition, air quality and water quality on tree growth.</p> <p>For additional information, obtain <i>Diagnosis of Air Pollutant and Natural Stress Symptoms on Forest Vegetation in Western Canada</i> (available at no cost from the Canadian Forestry Service, Natural Resources Canada).</p> <p>Measure/infer rates of transpiration and subsequent effect on weather and wildlife.</p>

COURSE FOR3090: FOREST ECOLOGY 2 (SILVICS & SUCCESSION) (continued)

Concept	Specific Outcomes	Notes
Forest Associations	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • explain how each tree species has unique site and climatic requirements that determine its ability to grow in particular environments • describe the general characteristics, life history, site and climatic requirements of five Alberta tree species; e.g.: <ul style="list-style-type: none"> – tree form – growth patterns and life cycle – soil – moisture – aspect and elevation • describe the general structural characteristics and environments of some common forest associations in Alberta; e.g.: <ul style="list-style-type: none"> – soil – moisture – position on slope. 	<p>Conduct field trips to classify growth sites.</p> <p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 2.4– Differences in Design • Activity 3.1–A Lot Depends on Location. <p>Discuss the “most likely site” to find a particular tree species.</p>
Forest Change	<ul style="list-style-type: none"> • identify living and nonliving agents of change in a local forest environment • infer structural and/or behavioural adaptations of living organisms to particular changes in the forest environment; e.g.: <ul style="list-style-type: none"> – adaptations to site conditions – reproductive adaptations • describe the impacts of specific environmental changes on a forest community; e.g.: <ul style="list-style-type: none"> – short-term consequences – long-term consequences • give examples of primary and secondary successional stages in a local forest environment • describe Alberta's natural forest history; e.g.: <ul style="list-style-type: none"> – role of fire – role of other agents. 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • Activity 1.6–Change in Forest Ecosystems • Activity 3.5– Controlling Fire <p>Relate to forest associations.</p> <p>Example: aspen/spruce understorey.</p> <p>Visit a mature forest and clearcut area. Compare and contrast the two areas and make predictions for each forest environment in five years.</p>

COURSE FOR3110: SILVICULTURE (GROWING THE FOREST)**Level:** Advanced**Theme:** Management and Conservation**Prerequisite:** None**Description:** Students demonstrate knowledge of the techniques used to establish, grow and harvest tree crops.**Parameters:** Access to a demonstration forest.

Off-campus learning may support the development of knowledge and skills in stand establishment and tending practices; consultation with the work-site supervisor will ensure that relevant safety considerations are addressed.

See the *Off-Campus Education Guide for Administrators, Counsellors and Teachers* (Alberta Education, 1997) for further information regarding off-campus learning.

Supporting Course: CTR2210 Workplace Safety (Practices) [Career Transitions Strand]

Students must have a general knowledge of potential hazards and accepted safety practices relevant to stand management prior to engaging in off-campus learning experiences. See Planning for Instruction in Section C for further information on student safety.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> describe silviculture and the silvics of Alberta tree species 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> identifying and describing: <ul style="list-style-type: none"> major components of silviculture, including stand establishment, stand management and harvest the silvics of five Alberta tree species. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Silviculture, FOR3110-1</i> <i>Sample Format: Silvics of a Tree Species, FOR3110-2</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	20

COURSE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate practices used to establish a stand of trees and manipulate growing conditions to favour particular species 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> conducting laboratory and/or field-based investigations that demonstrate regeneration by: <ul style="list-style-type: none"> natural methods, including natural seed supply and vegetative reproduction artificial methods, including direct seeding, bare-root and container seedlings. <p><i>Assessment Tool</i> <i>Lab Investigations: Natural and Artificial Regeneration, FOR3110-3</i> <i>Observation Checklist for Field-based Investigations, FOROBS</i></p> <p><i>Standard</i> <i>Conduct lab investigations to a standard of 3 on the rating scale <u>and/or</u> complete all sections of the observation checklist for field-based investigations</i></p> <ul style="list-style-type: none"> a teacher-prepared assessment in which the student demonstrates knowledge of practices used to establish and manage a stand of trees. <p><i>Assessment Tool</i> <i>Sample Assessment Items: Stand Establishment and Management, FOR3110-4</i></p> <p><i>Standard</i> <i>Response indicating 80% mastery</i></p>	<p>60</p>

COURSE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> • describe and compare methods of harvesting tree species • explain career opportunities relevant to silviculture 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> • demonstrating (or explaining) practical field techniques used to establish and tend a stand of trees. Tasks to include: <ul style="list-style-type: none"> – site preparation – cone collection and seed extraction – planting stock – spacing, thinning, pruning, fertilizer use. <p><i>Assessment Tool</i> <i>Task Checklist: Stand Establishment and Tending, FOR3110-5</i> <i>Lab Assessment: Outdoor Forest Experiences, FORLAB</i> <i>Observation Checklist for Field-based Investigations, FOROBS</i></p> <p><i>Standard</i> <i>Achieve a performance rating of :</i> <ul style="list-style-type: none"> – 2 in areas identified on the task checklist – 3 in applicable areas of lab assessment. <i>Complete all sections of the observation checklist for field-based investigations</i></p> <ul style="list-style-type: none"> • given access to current publications on harvest methods (e.g., clearcutting, seed tree, shelterwood, selection), completing a research project on: <ul style="list-style-type: none"> – the benefits and costs of different methods of harvest – appropriate methods of harvest (as determined by silvics) for each of seven Alberta tree species. <p><i>Assessment Tool</i> <i>Research Process: Forest Harvest Methods, FOR3110-6</i></p> <p><i>Standard</i> <i>Complete all components of research to a standard of 3 on the rating scale</i></p> <ul style="list-style-type: none"> • given current information on career opportunities in silviculture (e.g., labourer, technician, professional worker), completing a research project on one or more related careers. <p><i>Assessment Tool</i> <i>Career Search: Advanced Level, FORCAR-3</i></p> <p><i>Standard</i> <i>Conduct research to a standard of 3 on the rating scale</i></p>	<p></p> <p>10</p> <p>10</p>

COURSE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> demonstrate basic competencies. 	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> observations of individual effort and interpersonal interaction during the learning process. <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above.</i></p>	<p>Integrated throughout</p>

Concept	Specific Outcomes	Notes
<p>Silviculture and Silvics</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> define silviculture identify major components of silvicultural systems; e.g.: <ul style="list-style-type: none"> stand establishment stand management harvest and re-establishment explain how individual tree species have unique ecological requirements that determine suitable silvicultural practices compare and contrast the ecological requirements and silvics for two or more Alberta tree species describe one or more research programs designed to improve silvicultural practices; e.g.: <ul style="list-style-type: none"> genetic selection geographic information systems harvesting operations. 	<p>Discuss silviculture as the science and art of growing and tending forest crops to obtain more and better benefits from forests including wood.</p> <p>Invite a professional forester to explain components of silviculture.</p>

COURSE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Concept	Specific Outcomes	Notes
<p>Regeneration and Stand Treatment</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • demonstrate methods of regeneration where seedlings are established by natural methods; e.g.: <ul style="list-style-type: none"> – naturally supplied seeds – vegetative reproduction • demonstrate methods of regeneration where seedlings are established by artificial methods; e.g.: <ul style="list-style-type: none"> – planting bare-root and container seedlings – broadcasting seeds • compare natural methods of regeneration with artificial methods • demonstrate techniques for site preparation and the care and planting of seeds and seedlings • demonstrate intermediate stand tending techniques; e.g.: <ul style="list-style-type: none"> – cleaning – thinning – pruning – fertilizing – protecting • identify safety practices and policies relevant to site preparation, tree planting and stand tending • distinguish between intensive and extensive stand management practices. 	<p>Contact Land and Forest Services (Alberta Environmental Protection) prior to course delivery for information regarding:</p> <ul style="list-style-type: none"> • seedling availability • tour sites • equipment availability. <p>See <i>Alberta's Focus on Forests</i> (Activity 5.4–Reforestation: Forests or Tree Farms).</p> <p>Plan for practical field experiences in establishing a stand of trees and manipulating growing conditions to favour particular species.</p> <p>Opportunities may also exist for practical field experiences in seed collection and tree planting.</p> <p>Consider linking silviculture activities with school fundraising initiatives.</p> <p>Grow container plants and apply different levels of fertilization.</p> <p>Compare the nutrient requirements of young and mature stands.</p>

COURSE FOR3110: SILVICULTURE (GROWING THE FOREST) (continued)

Concept	Specific Outcomes	Notes
Cutting Methods	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify factors important in choosing a suitable method of harvest; e.g.: <ul style="list-style-type: none"> – growth characteristics – intended utilization – regeneration of species • describe current applications of different methods of harvesting trees; e.g.: <ul style="list-style-type: none"> – clearcutting method – seed tree method – shelterwood method – selection method • compare different methods of harvesting trees • relate appropriate harvest methods to individual tree species. 	<p>See <i>Alberta's Focus on Forests</i> (Activity 4.6–Cutting Styles).</p> <p>For additional information, obtain <i>Timber Harvesting Guidelines</i> (available from Land and Forest Services, Alberta Environmental Protection).</p> <p>Select three or more sites that exhibit different timber characteristics. Examine each site to determine timber condition and relevant harvest considerations.</p>
Career Opportunities	<ul style="list-style-type: none"> • outline potential careers and the range of occupational opportunities in silviculture: <ul style="list-style-type: none"> – professional – technical – labour-based • present the results of research on one or more employment opportunities in silviculture; e.g.: <ul style="list-style-type: none"> – nature of the work – number of workers/employment trends – entry requirements/competencies – education/training opportunities – opportunity for advancement. 	<p>Review National Occupational Profiles (NOC).</p> <p>Interview persons involved in silviculture practices.</p> <p>Provide opportunities for work experience and job shadowing.</p>

COURSE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)

Level:	Advanced
Theme:	Management and Conservation
Prerequisite:	FOR2120 Users in the Forest
Description:	Students develop and present an integrated plan for sustainable development of the forest resource.

Parameters: Access to government, industry and community organizations responsible for sustainable forest management and environmental stewardship; e.g., Alberta Environmental Protection, Alberta Forest Products Association, special-interest groups.

Note: This is a summative course that requires prior knowledge of the principles of sustainable management. It should be the last course studied in a series of Forestry courses.

Curriculum and Assessment Standards

General Outcomes	Assessment Criteria and Conditions	Suggested Emphasis
<i>The student will:</i> <ul style="list-style-type: none">describe basic forest management principles	<i>Assessment of student achievement should be based on:</i> <ul style="list-style-type: none">definitions and Alberta examples of sustainable development, sustained yield, integrated land use and multiple use management. <p><i>Assessment Tool</i> <i>Knowledge/Application Assessment: Forest Management Principles, FOR3120-1</i></p> <p><i>Standard</i> <i>Respond to a standard of 3 on the rating scale</i></p>	10

COURSE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)
(continued)

Concept	Specific Outcomes	Notes
Planning Process	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • identify short- and long-term goals for the management of forested land on an integrated basis; e.g.: <ul style="list-style-type: none"> – recreation – forage – wildlife habitat – wood fibre – oil and gas • identify scientific, economic and social factors to be addressed through the management plan; e.g.: <ul style="list-style-type: none"> – the objectives of different stakeholders – relevant government acts and regulations – forest inventory requirements – the silvics of tree species and appropriate harvest methods – consumer trends and markets for forest products – potential applications of research and technology • survey the views of different stakeholders in the forest and resolve conflicts that may arise; e.g.: <ul style="list-style-type: none"> – recreational – environmental – aboriginal – industrial – agricultural • incorporate consultation with other resource users and public involvement into the planning process • identify alternative means of achieving the management goals, and select the preferred alternatives • elaborate upon permits, licences or other legal agreements that may be required 	<p>See <i>Alberta's Focus on Forests</i>:</p> <ul style="list-style-type: none"> • 4.3–Forest Perspectives • Activity 5.5–Integrated Resource Management. <p>Interview a local land-owner to determine long-range goals for a particular woodlot/forested region. Prepare written management plans that are consistent with the landowner's long-range goals. Compare the plans prepared with the recommendations of a professional forester.</p>

COURSE FOR3120: INTEGRATED RESOURCE MANAGEMENT (BALANCING NEEDS)
(continued)

Concept	Specific Outcomes	Notes
<p>Planning Process (continued)</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> • develop a set of actions and present the management plan; e.g.: <ul style="list-style-type: none"> – a general description of the forested area – long-term management objectives – short-term management objectives – proposed management standards and guidelines – a schedule of short-term development activities • prepare a map to accompany and elaborate upon the management plan; e.g.: <ul style="list-style-type: none"> – boundaries of the forested area – forest cover and other resources within the area – physical features – history of past development – road access – proposed development activities • describe techniques for monitoring the management plan to ensure that goals are being achieved. 	<p>Specific management plans will vary, but need to address some common actions.</p>