

**South King County Tech Prep Consortium
Natural Resources Competencies
Green River Community College**

Introduction to Natural Resources (NATRS 100) = 5 cr	
Knowledge	Skill
Education and Careers	
The three career pathways: public, private, self-employed.	List two employers in each pathway. List one position found in each pathway.
The difference between a forest technician and a forester.	List three duties of a forest technician. List three duties of a forester that are different than a forest technician.
Natural Resources programs of GRCC.	List the two degrees that GRCC awards in Natural Resources. List the five options that GRCC awards in the A.A.S. degree in Forest Resources.
Forest/Natural Resources programs at universities.	List a university in five of the western states that offer B.S. degrees in forest or natural resources.
The professional society of foresters and forest technicians.	Print the web home page of the professional society that accredits forestry curricula.
Career pathway of the learner's interest.	Prepare a research report of a career possibility that the student has an interest in.
Silvics and Forest Biology	
Gymnosperms and Angiosperms	Give two examples each of a gymnosperm and an angiosperm.
Photosynthesis	Describe the photosynthetic process and where it occurs.
Respiration	Describe the respiration process in a tree.
Tree reproduction	Draw and label the reproduction of both an angiosperm and gymnosperm tree.
Monoecious and dioecious reproduction	Define monoecious and dioecious reproduction. Give a tree example for each.
Sexual and asexual reproduction	Give an example of two trees that can reproduce by asexual reproduction.
Parts of a tree and the function of each part.	Draw and label the bark, phloem, cambium, xylem, heartwood, sapwood, pith, annual rings, summerwood, and springwood. Describe the function of each of the above listed parts of a tree. Also describe where juvenile wood is located.
Vapor Pressure Deficit Theory	Describe how water moves through a tree by vapor pressure deficit.

Tree growth	Name and describe the growth that contributes to height and root growth. Name and describe the growth that contributes to diameter growth. Observe and record in which week Douglas-fir terminal and lateral buds open.
Five factors affect seedling/plant growth and survival: light, moisture, temperature, physical factors, and chemical factors.	List an example of how each factor is important to seedling/plant growth and survival.
Growth substances/enzymes	Describe the role of growth substances or enzymes in the physiological processes of growth, reproduction, dormancy, senescence.
Soils	Find an exposed bank along a creek or cut-slope. Identify, draw, and label the O, A, B, C horizons. Describe the importance of each.
Soil characteristics--texture	Draw to scale an example of sand, gravel, cobble, and boulder. Why can't you draw silt?
Soil characteristics--arrangement	Draw an example of columnar, blocky, platy, and granular soils.
Importance of texture and arrangement.	Describe the importance of texture and arrangement in terms of water movement and storage. How does this affect a plant?
Importance of soil in relation to plants	List two macronutrients and two micronutrients List three functions of soil relative to plants.
Nitrogen cycle	Describe the nitrogen cycle.
Nitrogen fixation	Describe the role of bacteria in fixing nitrogen.
Carbon cycle	Describe the carbon cycle and list three means that carbon returns to the atmosphere.
Forest Ecology	
Terminology	Define and give an example of the terms: Forest ecology, biome, dendrology, autecology, synecology, stand, type, drainage (watershed), ecosystem, succession, seral, even-aged, uneven-aged, fugitive species, pioneer species.
Size classes	Draw an example of seedling, sapling, pole- size, saw-timber, and old growth.
Crown classes	Draw an example of a stand with dominant, codominant, intermediate, and suppressed.
Succession	Define and give an example of primary, secondary, and gap-phase succession.
Succession theories	Give an example of climax, relay, or initial floristic theory. Identify a stand that fits the theory.
Seral forests	Define and give an example of a seral forest.

Shade tolerance	Define shade tolerance. Tell the importance of this concept in forest succession; use examples of species that are shade-tolerant, intermediate, and intolerant.
Growth and yield	Define and contrast the terms growth and yield.
Site	Define site, site index, and site class. Describe how site index sets the buffer widths of stream management and riparian zones.
Site Index Curves	Find a site index curve for Pacific Northwest Douglas-fir. A site class III would have what site index at 50 years? How tall would these trees be at 80 years?
Forest biomes	Draw a transect from the Pacific Ocean to Ellensburg. Show two seral species and one climax species in each of the 6 forest zones recognized across this transect.
Silviculture	
Terminology	Define and give an example: fertilization, silviculture, rotation age, wildlife tree, clearcut, shelterwood, seed-tree regeneration, coppice, selective harvesting, sustained yield, allowable cut, real-estate cut.
Silvicultural systems	Draw and label an example of an even-aged pure stand and an uneven-aged mixed stand.
Retention	Draw and label an example of a clearcut with dispersed retention and a clearcut with aggregated retention.
Site preparation	Describe the objective of site preparation and give four examples of site preparation used.
Regeneration systems	Give a biological reason for using clearcutting, seedtree, shelterwood, coppice, and selection cutting. Which system can produce uneven-aged stands? Which system can produce a two-aged stand?
Density and stocking	Contrast density and stocking.
Density control	Give three reasons why density control is used.
Thinning	Describe low thinning, high thinning, and mechanical thinning. Which type is used in the Pacific Northwest?
Young stand management	Explain individually why herbicides, pruning, and precommercial thinning are used.
Regeneration	Draw and label a plug and a bareroot seedling. Describe the difference between a 2-0, 1-1, 2-1, plug, and P-1. When ordering seedlings, describe why seed zone and elevation are important.

Fire Ecology	
Terminology	Define and give an example of prescribed fire, wildfire, underburning, and pile burning.
Fire triangle	Draw the fire triangle and describe how to put out a fire by attacking each of the components.
Wildfire	Define and describe ground fire, surface fire, and crown fire.
Risk and hazard	Give an example of a risk and a hazard.
Fire behavior	Give an example of how topography, fuels, and weather affect fire behavior.
Prescribed fire	Give five reasons for using fire as a management tool.
Fire adaptation	Give an example of a species that has serotinous cones and how this assists regeneration. Give two examples of trees in Washington that have adapted to fire by other means.
Fire policy	Describe the "Let Burn" policy adopted in 1968 by the National Park Service. How has fire suppression over the past century changed species composition, vegetation, density, and forest structure? Describe the scenario of conditions and events that have led to catastrophic fires recently.
Fire Impacts	Describe the fire behavior conditions that would lead to a hot fire and the conditions leading to a cool fire. List three effects on the forest ecosystem of both a hot fire and a cool fire.
Water	
Terminology	Define: Drainage (watershed), discharge, velocity, stream order, stream type (Forest Practice Regulations), water table, erosion, intermittent stream, perennial stream, pond or lake, marsh, swamp, bog or fen, wetland, riparian zone, riffle, pool, cascade, glide.
Hydrologic cycle	Draw and label the 8 components of the hydrologic cycle, including the energy source.
Managing water quality	Give an example of a physical parameter, biological parameter, and chemical parameter that we monitor to manage water quality.
Wetlands	Describe the three characteristics required to identify a wetland.
Fish	Identify a fish species in a local stream. What are the characteristics of the fish that were used to identify it?

Wildlife	
Needs of wildlife (from Leopold)	Describe why food, water, and cover are important to wildlife. Describe and give an example of shelter and protection.
Wildlife habitat	List 5 size classes found in forest succession. Give one advantage and one disadvantage of each size class for wildlife as it relates to the needs of wildlife (particularly food, shelter, and protection).
Wildlife policy	Describe the importance of the Endangered Species Act (1973).
Food chain	Define and give an example of the relationship: primary consumer, secondary consumer, and food chain.
Carrying capacity	Define carrying capacity.
Ecotones	Discuss why edges (ecotones) are traps as it relates to predation.
Wildlife management	Define and give an example of a Habitat Conservation Plan (HCP). Describe 3 positive and 3 negative influences of wildlife for forests. Which forest size class provides the most incidence of both birds and mammals? Why? Define "fragmentation" and "corridors" and relate these in terms of survival of species.
Snags and wildlife trees	Tell the importance of primary excavators. Describe how cavities are used for shelter and protection.
Forest History	
Importance of American forests through history (from Young-Giese, Forest Science)	Describe for each period, the attitude toward forests and the management used: <ul style="list-style-type: none"> · Native Americans to 1607 · Colonial period 1607-1776 · Period of Acquisition 1776-1830 · "Erosion of Myths" 1830-1890 (both the exploitive movement and the conservation/ preservation movement) · "Division of Philosophies" 1890-1911 · "Organization, Action, Conflict" 1911-1952 · Modern Era 1952-present
Forest policy	Define and describe the relevance of each of the following events: <ul style="list-style-type: none"> · Broad arrow policy · Louisiana purchase · Alaska purchase · manifest destiny · public school grants · rectangular (public land) survey system · railroad land grants

	<ul style="list-style-type: none"> · Clarke-McNary Act · Weeks Act · Section 24 of the General Revision Act (1891) · Organic Administration Act of 1897 · National Park Act of 1916 · Cooperative Sustained-Yield Unit Act (1944) · Multiple Use-Sustained Yield Act of 1960 · Endangered Species Act of 1973
Leaders	<p>Describe the role, philosophy, and legacy of the following individuals on American forest policy:</p> <ul style="list-style-type: none"> · Franklin B. Hough · Gifford Pinchot · John Muir · Teddy Roosevelt · Aldo Leopold · Rachel Carson
Organizations	<p>Describe the role and impact of each of the following organizations on forest policy:</p> <ul style="list-style-type: none"> · Civilian Conservation Corps (CCC) · American Forestry Association · Society of American Foresters · Sierra Club · National Parks and Conservation Association · Non-industrial private forestland (NIPF) owners
Organization and Structure	<p>Explain which agency originally controlled the public domain.</p> <p>Explain which cabinet-level organizations direct the Forest Service, National Park Service, Bureau of Land Management, Bureau of Indian Affairs, and US Fish and Wildlife Agency.</p> <p>Describe the differences in the role and purpose of the National Park Service and the Forest Service.</p> <p>Which agency is responsible for the Wilderness System?</p> <p>When were the Forest Practice Regulations first enacted in Washington state?</p> <p>What agency is responsible for the Forest Practice Regulations?</p> <p>What is the title of the person that heads the state agency that is responsible for the Forest Practice Regulations?</p>
Forest Management	<p>Tell how the Department of Natural Resources is supposed to fund new school construction.</p> <p>Tell how the Forest Service is supposed to fund county roads and schools.</p> <p>What group owns over half the commercial forestland in the United States?</p>