School of Natural Resources

Robert C. Burns, Division Director of Forestry and Natural Resources
e-mail: robert.burns@mail.wvu.edu (Robert.Burns@mail.wvu.edu)

Gerard D’Souza, Division Director of Resource Economics and Management
e-mail: gdsouza@mail.wvu.edu

Programs of Study

The School of Natural Resources is home to programs in Agribusiness Management; Energy Land Management; Environmental and Energy Resources Management (eQuad); Environmental and Natural Resources Economics; Forest Resources Management; Recreation, Parks, and Tourism Resources; Wildlife and Fisheries Resources; and Wood Science and Technology. As a student in this school you may pursue a degree that enables you to begin a career in agribusiness management; arboriculture and urban forestry; conservation ecology; environmental and resource economics; fisheries biology; forest management; forest products industry; land management; natural resources (including energy) management; outdoor recreation, and wildlife biology. Students are also well-prepared for graduate study in these or allied fields.

Courses that you will take in the School depend on a student’s particular program. A primary mission of the School of Natural Resources is to further the understanding, stewardship, and sustainable use of renewable natural resources by educating students to become knowledgeable professionals and citizens, advancing and communicating research knowledge, and providing technical information and professional service to society. Students completing a Bachelor of Science degree in the School of Natural Resources fulfill broad general education foundation requirements, Bachelor of Science degree requirements, and a study of at least one discipline in depth. The School of Natural Resources strives to spark a passion in our students for the principles of stewardship and sustainability of our renewable natural resources by:

• offering students the education to assume leadership roles
• advancing research knowledge
• providing technical information and professional service to society

Accreditation

The B.S.F. in Forest Resources Management and B.S. in Recreation, Parks, and Tourism Resources are accredited by the Society of American Foresters. The Wildlife and Fisheries Resources curriculum requires the coursework needed for professional certification by The American Fisheries Society (Fisheries emphasis) or The Wildlife Society (Wildlife emphasis) under 2014 guidelines. The Wood Science and Technology program is accredited by the Society of Wood Science and Technology. The Energy Land Management program is one of twelve programs in North America accredited by the American Association of Professional Landmen.

FACULTY

DIVISION DIRECTORS

• Robert C. Burns (Director, Division of Forestry and Natural Resources) - Ph.D. (The Pennsylvania State University)
• Gerard E. D’Souza (Director, Division of Resource Economics and Management) - Ph.D. (Mississippi State University)

PROFESSORS

• James T. Anderson - Ph.D. (Texas Tech University)
  Wildlife ecology and management
• Robert C. Burns - Ph.D. (The Pennsylvania State University)
  Understanding recreational behavior, motivations, and satisfaction levels
• Alan R. Collins - Ph.D. (Oregon State University)
  Resource economics
• Ben Dawson-Andoh - Ph.D. (University of British Columbia)
  Wood microbiology and chemistry
• Gerard E. D’Souza - Ph.D. (Mississippi State University)
  Production economics, Finance
• John W. Edwards - Ph.D. (Clemson University)
  Wildlife ecology and management
• Kyle J. Hartman - Ph.D. (University of Maryland)
  Aquatic ecology, Fish management
• David W. McGill - Ph.D. (The Pennsylvania State University)
  Woodland owner outreach, forest regeneration
• Joseph F. McNeel - Ph.D. (Virginia Tech)
  Forest harvest and operations
• J. Todd Petty - Ph.D. (University of Georgia)
  Stream and river ecology, watershed assessment and restoration
• Tim T. Phipps - Ph.D. (University of California, Davis)
  Resource economics, Agricultural policy
• Chad Pierskala - Ph.D. (University of Minnesota)
  Public resource land management and agricultural tourism
• Peter V. Schaeffer - Ph.D. (University of Southern California)
  Regional science, Applied microeconomics
• Steven Selin - Ph.D. (University of Oregon)
  Human dimensions and Natural resources management
• Michael P. Strager - Ph.D. (West Virginia University)
  Spatial analysis, Decision support
• Jingxin Wang - Ph.D. (University of Georgia)
  Biomass logistics, utilization and bioenergy, forest BMPs

ASSOCIATE PROFESSORS
• Cheryl Brown - Ph.D. (University of California, Berkeley)
  Agricultural and food policy and economics, Agribusiness
• Gregory A. Dahle - Ph.D. (Rutgers University)
  Arboriculture and urban forestry
• Jinyang Deng - Ph.D. (University of Alberta)
  Ecotourism
• David B. DeValiance - Ph.D. (Oregon State University)
  Renewable materials manufacturing and biofuel evaluation
• Kathryn Arano Gazal - Ph.D. (Mississippi State University)
  Forest economics and policy
• Jamie Shuler - Ph.D. (North Carolina State University)
  Forest regeneration and restoration
• Kaushlendra Singh - Ph.D. (University of Georgia)
  Thermo-chemical conversion and bioenergy
• Doolarie Singh-Knights - Ph.D. (West Virginia University)
  Agribusiness and entrepreneurship; Extension
• Dave Smaldone - Ph.D. (University of Idaho)
  Environmental and Cultural Interpretation, Nature-based tourism
• Mark Sperow - Ph.D. (Colorado State University)
  Production and resource economics
• Ben D. Spong - Ph.D. (Oregon State University)
  Forest operations, roads, and harvesting
• Amy Welsh - Ph.D. (University of California-Davis)
  Conservation genetics and wildlife forensics
• Nicholas P. Zegre - Ph.D. (Oregon State University)
  Watershed and forest hydrology

ASSISTANT PROFESSORS
• Donald Brown - Ph.D. (Texas State University)
  Herpetology, wildlife ecology
• Elizabeth Byrd - Ph.D. (Purdue University)
  Energy, Law, Agribusiness
• Sophan Chhin - Ph.D. (University of Alberta)
  Quantitative forest management
• Levan Elbakidze - Ph.D. (Texas A&M University)
  Shale gas; water and energy economics
• Xiaoli Etienne - Ph.D. (University of Illinois)
  Commodity futures markets and price analysis
• Shawn Grushecky - Ph.D. (West Virginia University)
Energy land management
• Christopher Lituma - Ph.D. (University of Tennessee)
  Ornithology and bird ecology
• Kudzayi Maumbe - Ph.D. (Michigan State University) Tourism
  Tourism
• Gloria Oporto - Ph.D. (University of Maine)
  Biomaterials
• Christopher Rota - Ph.D. (University of Missouri)
  Applied vertebrate ecology
• Heather Stephens - Ph.D. (Ohio State University)
  Resource, energy and regional economics

VISITING ASSISTANT PROFESSORS
• Charlene Kelly - Ph.D. (Virginia Tech)
  Watershed biogeochemistry
• Kirsten Stephan - Ph.D. (University of Idaho)
  Soil and vegetation management

ADJUNCT PROFESSORS
• Patricia M. Mazik - Ph.D. (Memphis State University)
  Aquatic toxicology, fish physiology
• Sheldon Owen - Ph.D. (West Virginia University)
  Extension wildlife specialist
• Stuart A. Welsh - Ph.D. (West Virginia University)
  Ichthyology
• Petra B. Wood - Ph.D. (University of Florida)
  Avian ecology

In this section:
• Arboriculture (p. 3)
• Agribusiness Management (p. 4)
• Agricultural and Natural Resources Law (p. 4)
• Conservation Ecology (p. 5)
• Environmental Economics (p. 5)
• Forestry Resources Management (p. 5)
• Recreation, Parks, and Tourism Resources (p. 6)
• Sustainable Low-Rise Residential Construction (p. 6)
• Wildlife and Fisheries Resources (p. 6)
• Wood Science and Technology (p. 7)

ARBORICULTURE
MINOR CODE - U073
The minor in arboriculture is designed to provide students educational opportunities in the area of ornamental horticulture as it relates to current urban environments. Emphasis is given to the establishment and management of herbaceous and woody plants used in commercial, recreational, and home settings.

A minimum GPA of 2.0 is required in all minor courses

<table>
<thead>
<tr>
<th>Minor Requirements</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRN 410</td>
<td>Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>FOR 205</td>
<td>Dendrology</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>HORT 260</td>
<td>Woody Plant Materials</td>
<td></td>
</tr>
<tr>
<td>LARC 260</td>
<td>Ornamental Woody Plants and Groundcovers</td>
<td></td>
</tr>
<tr>
<td>Select 9 hours from the following:</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>
Select two of the following electives: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRN 315</td>
<td>Turfgrass Management</td>
</tr>
<tr>
<td>FMAN 440</td>
<td>Forestry Consulting</td>
</tr>
<tr>
<td>HORT 262</td>
<td>Herbaceous Plant Materials</td>
</tr>
<tr>
<td>HORT 441</td>
<td>Garden Center Management</td>
</tr>
</tbody>
</table>

Total Hours 24

* Must be related to an arboriculture topic and must be approved in advance by the director of the Division of Plant and Soil Sciences or the director of the Division of Forestry and Natural Resources.

### AGRIBUSINESS MANAGEMENT

**MINOR CODE - U047**

A minimum grade of C- is required in all courses for the minor.

**Minor Requirements:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE 110</td>
<td>Agribusiness Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ARE 204</td>
<td>Agribusiness Management</td>
<td>3</td>
</tr>
<tr>
<td>ARE 461</td>
<td>Agribusiness Finance</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE 431</td>
<td>Marketing Agricultural Products</td>
</tr>
<tr>
<td>ARE 435</td>
<td>Marketing Livestock Products</td>
</tr>
</tbody>
</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE 382</td>
<td>Agricultural and Natural Resources Law</td>
</tr>
<tr>
<td>ARE 421</td>
<td>Rural Enterprise Development</td>
</tr>
<tr>
<td>ARE 440</td>
<td>Futures Markets and Commodity Prices</td>
</tr>
<tr>
<td>ARE 482</td>
<td>Enterprise Operation Law</td>
</tr>
<tr>
<td>ARE 484</td>
<td>Agribusiness Strategic Management</td>
</tr>
</tbody>
</table>

Total Hours 15

### AGRICULTURAL AND NATURAL RESOURCES LAW

**MINOR CODE - U139**

**Program Requirements**

A minimum grade of C- is required in all courses for the minor.

**Minor Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE 382</td>
<td>Agricultural and Natural Resources Law</td>
<td>3</td>
</tr>
<tr>
<td>RESM 450</td>
<td>Land Use Planning Law</td>
<td>3</td>
</tr>
<tr>
<td>RESM 480</td>
<td>Environmental Regulation</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE 482</td>
<td>Enterprise Operation Law</td>
</tr>
<tr>
<td>ENLM 400</td>
<td>Energy Land Management Contracts 1</td>
</tr>
</tbody>
</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARE 450</td>
<td>Agriculture, Environmental and Resource Policy</td>
</tr>
<tr>
<td>ENLM 420</td>
<td>Energy Land Management Contracts 2</td>
</tr>
</tbody>
</table>
CONSERVATION ECOLOGY

MINOR CODE - U071

This minor is designed to provide students specialized knowledge and skills in the area of conservation ecology. Completion of this minor allows new career opportunities, enhances lifelong learning, and promotes the role of an informed and active citizen.

Minor Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMAN 150</td>
<td>Principles of Conservation Ecology</td>
<td>3</td>
</tr>
<tr>
<td>WMAN 200</td>
<td>Restoration Ecology</td>
<td>3</td>
</tr>
<tr>
<td>WMAN 313</td>
<td>Wildlife Ecosystem Ecology</td>
<td>4</td>
</tr>
<tr>
<td>WMAN 421</td>
<td>Renewable Resources Policy and Governance</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following: 3-4

- GEN 371 Principles of Genetics
- WMAN 330 Conservation Genetics

Total Hours: 16-17

ENVIRONMENTAL ECONOMICS

MINOR CODE - U053

Fifteen hours and a GPA of at least 2.0 in courses counted toward the minor.

Environmental Problems or Issues (select one of the following): 3

- ARE 187 Energy Resource Economics
- ARE 201 Principles of Resource and Energy
- ENVP 155 Elements of Environmental Protection
- FOR 140 West Virginia's Natural Resources

Environmental and Resource Economics 9

- ARE 220 Introductory Environmental and Resource Economics
- ARE 401 Applied Demand Analysis
- ARE 410 Environmental and Resource Economics

Law, Policy, or Analysis (select one of the following): 3

- ARE 382 Agricultural and Natural Resources Law
- ARE 450 Agriculture, Environmental and Resource Policy

Total Hours: 15

FOREST RESOURCES MANAGEMENT

MINOR CODE - U090

The minor in Forestry Resources Management is designed to provide students educational opportunities in the area of forest resources management. Emphasis is given to those courses that provide a specific skill set or knowledge base needed to understand sustainable forest management in the Appalachian region. This minor requires a grade of C or higher in each course.

A grade of C or higher must be earned in all minor courses

Minor Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMAN 212</td>
<td>Forest Ecology</td>
<td>3</td>
</tr>
<tr>
<td>FMAN 222</td>
<td>Forest Mensuration</td>
<td>4</td>
</tr>
<tr>
<td>FMAN 311</td>
<td>Silvicultural Systems</td>
<td>4</td>
</tr>
<tr>
<td>FOR 205</td>
<td>Dendrology</td>
<td>3</td>
</tr>
<tr>
<td>FMAN 330</td>
<td>Principles of Forestry Economics</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following: 3

- FMAN 433 Forest Management
- FHYD 444 Watershed Management

Total Hours: 15
RECREATION, PARKS, AND TOURISM RESOURCES
MINOR CODE - U085
The minor in Recreation, Parks, and Tourism Resources is designed to provide students with specialized knowledge and skills that may open the door to new career opportunities, enhance lifelong learning, and promote their role as an informed and active citizen. The minor emphasizes the ecological, economic, and social psychological aspects of managing outdoor recreation and tourism resources. A grade of "C" or higher must be earned in all courses counted toward the minor.

Minor Requirements
RPT 142 Introduction to Recreation, Parks and Tourism 2
RPT 239 Sustainable Tourism Development 3
RPT 242 Environmental and Cultural Interpretation 3
RPT 365 Planning and Design in Recreation, Parks and Tourism 3
FOR 438 Human Dimensions Natural Resource Management 3
or RPT 491 Professional Field Experience
RPT 335 Management in Recreation, Parks and Tourism Organizations 3
or RPT 433 Recreation Resource Management

Total Hours 17

SUSTAINABLE LOW-RISE RESIDENTIAL CONSTRUCTION
MINOR CODE - U126
This minor is designed to provide students with a background in sustainable low-rise residential (i.e. single family, multi-family town houses and 2-3 story apartment buildings) construction materials and practices.

WDSC 245 Residential Building Materials 3
WDSC 320 Sustainable Construction 3
SAFM 470 Managing Construction Safety 3

A minimum of nine hours selected from the following:
WDSC 225 Finished Wood Products
WDSC 341 Wood Mechanics
ID 420 Codes and Interior Construction
ID 325 Computer-Aided Drafting and Design
DSGN 293 Special Topics

Total Hours 18

WILDLIFE AND FISHERIES RESOURCES
MINOR CODE - U044
The Wildlife and Fisheries Resources minor is designed to provide students with the necessary background and skills to effectively conserve and manage fish and wildlife habitats and populations. A minimum GPA of 2.0 is required in all minor courses.

Minor Requirements
WMAN 175 Introduction to Wildlife and Fisheries 3
WMAN 224 Vertebrate Natural History 3
Select Three of the following courses 9-12
WMAN 300 Wildlife and Fisheries Techniques
WMAN 313 Wildlife Ecosystem Ecology
WMAN 330 Conservation Genetics
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>WMAN 425</td>
<td>Mammalogy</td>
<td></td>
</tr>
<tr>
<td>WMAN 426</td>
<td>Ornithology</td>
<td></td>
</tr>
<tr>
<td>WMAN 445</td>
<td>Introduction to Fisheries Management</td>
<td></td>
</tr>
<tr>
<td>WMAN 446</td>
<td>Freshwater Ecology</td>
<td></td>
</tr>
<tr>
<td>WMAN 450</td>
<td>Advanced Wildlife and Fisheries Management</td>
<td></td>
</tr>
</tbody>
</table>

**Total Hours: 15-18**

**WOOD SCIENCE AND TECHNOLOGY**

The minor in Wood Science and Technology is designed to provide students with specialized knowledge and skills in the properties, manufacture, and utilization of wood and related biomaterial products. Emphasis is given to courses that provide a fundamental education in the properties of wood, manufacturing processes for wood-based materials, and utilization of wood materials.

**MINOR CODE - U045**

A minimum GPA of 2.0 is required in all minor courses.

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDSC 223</td>
<td>Wood Anatomy and Structure</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following: 3 hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDSC 340</td>
<td>Physical Properties of Wood</td>
</tr>
<tr>
<td>WDSC 341</td>
<td>Wood Mechanics</td>
</tr>
<tr>
<td>WDSC 413</td>
<td>Wood Chemistry</td>
</tr>
</tbody>
</table>

Select four of the following: 12 hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDSC 100</td>
<td>Forest Resources in United States History</td>
</tr>
<tr>
<td>WDSC 232</td>
<td>Wood Grading and Procurement</td>
</tr>
<tr>
<td>WDSC 320</td>
<td>Sustainable Construction</td>
</tr>
<tr>
<td>WDSC 330</td>
<td>Wood Machining</td>
</tr>
<tr>
<td>WDSC 337</td>
<td>Wood Adhesion and Finishing</td>
</tr>
<tr>
<td>WDSC 340</td>
<td>Physical Properties of Wood</td>
</tr>
<tr>
<td>WDSC 341</td>
<td>Wood Mechanics</td>
</tr>
<tr>
<td>WDSC 351</td>
<td>Forest Products Protection</td>
</tr>
<tr>
<td>WDSC 362</td>
<td>Forest Product Decision-Making</td>
</tr>
<tr>
<td>WDSC 413</td>
<td>Wood Chemistry</td>
</tr>
<tr>
<td>WDSC 422</td>
<td>Harvesting Forest Products</td>
</tr>
<tr>
<td>WDSC 465</td>
<td>Wood-based Composite Materials</td>
</tr>
</tbody>
</table>

**Total Hours: 18**