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Educating rangeland ecology and management professionals in the 21st century

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Abstract
Essential knowledge and skills required of rangeland managers have traditionally been taught on land-based campuses with access to field sites. However, as the demand for online education has grown and enrollment in traditional rangeland sciences programs has declined, Oregon State University (OSU) has adapted by offering an online program (Ecampus) and hybrids of on-campus and online programs to enhance enrollment and maximize the availability of faculty to students in all modalities. The Animal and Rangeland Sciences Department at OSU currently educates ten percent of all undergraduates earning a rangeland sciences, or related degree, as accredited by the Society for Range Management (SRM).

A description of the degree, the required coursework and quality assurance through accreditation are detailed. Student advising practices and the availability of extracurricular activities, including participation in SRM are included. Despite the OSU Rangeland Sciences program's design to capture an ever-increasing number of students who seek online education, low enrollment and lengthy periods for degree completion are viewed as impediments to maintenance of the multi-campus program.

Introduction

The Rangeland Sciences program in the Department of Animal and Rangeland Sciences at Oregon State University (OSU) educates students by offering a Bachelor of Science degree as well as educating non-degree-seeking, post-baccalaureate, students. This model of educating traditional undergraduates and working professionals provides a diverse learning environment for all learners. Professionals working on rangelands gain knowledge of ecological principles while their classmates gain from the professional experiences of their classmates seeking continuing education for career advancement. Degree-seeking students can earn the Rangeland Sciences degree via three different pathways which include: 1) coursework on the Corvallis campus, 2) coursework on the La Grande campus or 3) coursework via the online offering, Ecampus. Students can attend via any combination of these three pathways. Many students are post-baccalaureate who are fulfilling requirements needed to advance in their careers as per the Office of Personnel Management (OPM) requirements for positions with the US Federal government.

To enrich the learning options for all students, faculty have developed 'field hybrid' courses in which students from any of the three pathways can enroll. The current trend is increased Ecampus enrollment with growth of 4%, year-over-year, to 11,430 in the fall of 2023 (Nealon, 2023). Concurrently, there has been a decline in enrollment on the Corvallis and La Grande campuses.

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Educational Program (Methods)

Degree Description

Rangeland Sciences at OSU is an undergraduate degree which focuses on the ecology and management of rangelands across a variety of arid and semi-arid ecosystems including shrublands and grasslands (Rangeland Sciences Undergraduate Major 2024). This program uses a multi-disciplinary approach to provide advanced scientific knowledge of ecological processes and social drivers influencing rangeland ecosystems around the globe. Students gain the skills and knowledge needed to understand and effectively manage rangelands for improved productivity and enhanced ecosystem resilience. The goal is that graduates of the program will be able to integrate contemporary rangeland ecology and management principles into a systems-based decision-making framework that promotes ecological resilience, sustainable societies, and thriving economies in rangeland systems.

Required Coursework

To earn the Bachelor of Science, students must complete eight upper division courses within the Animal and Rangeland Sciences Department as well as the usual mathematics, statistics, life sciences, chemistry, writing and humanities electives. Departmental faculty members teach rangeland ecology principles, wildland plant identification, ecology of grasslands, ecology of shrublands, rangeland ecohydrology, vegetation monitoring and analysis, restoration and management, rangeland-animal relations and rangeland management planning principles and processes (Rangeland Sciences Undergraduate Major 2024). Electives in wildlife habitat analysis, riparian ecohydrology and management and pastoral systems of the world are also offered. Related coursework in Botany, Soil Science and Fisheries and Wildlife Conservation are offered by those Departments, also in the College of Agricultural Sciences.

Teaching Modalities

All courses are offered on-campus and via Ecampus with the same student learning objectives for all sections. This requires innovation on the part of faculty as the asynchronous online learning environment changes the nature and timing of faculty-student and student-student interactions. The usual dialog in on-campus courses is conducted in a modified manner via Discussion boards within the learning management system (LMS). Questions within Ecampus Discussion require application of course content as well as interaction with peers and faculty. Recorded lectures, with captioning, are part of every weekly Module in the Ecampus sections of the courses. Incorporation of research faculty work and research outcomes are shared across the courses with guest lectures and accompanying required reading. When courses are developed, and updated through a 're-development' process, specialists in online education work with the Rangeland Science educators to ensure up-to-date resources are used. Most courses are taught by one or two individuals across the three campuses.

Maintaining Quality

The Rangeland Sciences degree is aligned with the US Office of Personnel Management (OPM) standards which allows graduates to begin careers with the US Federal government in various agencies including the US Department of Agriculture and the US Department of the Interior. Graduates are also sought by State land management agencies, private land trusts and private landowners such as livestock producers.

The undergraduate degree program at OSU is accredited by the Society for Rangeland Management (SRM) with the most recent review in 2023. The seven SRM Accreditation Standards for University Accreditation include criteria for the education of the faculty, role of faculty within the university, degree name, depth and breadth of the curriculum, advising of students, extracurricular opportunities for students, continuing professional development of the faculty, self-assessment of program effectiveness and university support for the program. The SRM criteria-based system is valued by educators as well as rangeland ecologists and managers. This and other endorsements of university programs are highly valued by university administrators. OSU (2024) is a member institution of the Northwest Commission of Colleges and Universities (NWCCU) and shares this information with the public via web pages and reports. This is a critical component of maintaining public trust.

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To meet the requirements for accreditation of OSU by the NWCCU, a set of five programmatic learning outcomes was established by the teaching faculty. These are aligned with SRM standards. Student performance data are collected from all sections of courses in which the programmatic learning outcomes are taught. Faculty review performance on an annual basis with guidance from the Assessment Lead who is a peer in the academic unit. Comparisons across campuses and across time are used to revise teaching and assessment methods.

Orientation and Advising

All students who enroll as freshmen at OSU are required to attend a START new student orientation session whether on campus or in a virtual session (Office of Student Orientation 2024). These sessions introduce students to academic, financial and social resources. Family members can also attend specialized sessions which include how to support the student and family transitions when sending a student to college.

Each student meets with an assigned Advisor to review course selection for the upcoming academic term. Extracurricular activities, including summer internships or employment are also discussed. These regular interactions ensure that students enroll in courses for which they are prepared and those which are most suited to the degree. Post-baccalaureate students have diverse educational goals and so advising them is complex as it requires consideration of past collegiate level coursework and work-life balance concerns.

Field-based Learning and Faculty Innovation

Four of the eight required courses included multi-day field trips to locations in northeast, central and southeast Oregon, prior to 2011 when two academic units were merged. Although field trips are still required in some on-campus courses, budgetary pressures and the transition to include the Ecampus program have been challenging for faculty. Concurrently with Ecampus course development, on-campus enrollment declined and over the past decade the number of courses with required field trips has declined as well.

To address the need for experiential learning, Ecampus and many on-campus sections now include activities that require students to explore rangeland ecology principles, no matter where the student lives. These assignments require students to select a field site to explore. Careful, step-by-step instructions must be followed and students document their work with photos, descriptions and video clips of their efforts, observations and conclusions. Complete work is uploaded into the online learning management system for view by faculty and peers. Peer evaluation is incorporated where appropriate. In this way, a student can see a location not available to them and receive feedback on what their classmates observe. Students in urban areas are provided coaching on how to select a park or natural space that is most suitable. In the grassland ecology course, a student living in Las Vegas, Nevada was directed to conduct the grassland ecology activity in the riparian zone of a local river. Site characteristics had to meet the requirements of the assignment. While the student was not exploring an established grassland, the site provided a suitable stand-in for the examination of deeply-rooted perennial grasses and the other components of the assignment.

Another innovation to address the need for hands-on learning is the ‘field hybrid’. Faculty based at the OSU Eastern Oregon Agriculture and Natural Resources Program office a ‘field hybrid’ version of the vegetation measurement and analysis course (see **Required Coursework** above) in which students spend a week at the Starkey Experimental Forest and Range and the Zumwalt Prairie in Northeast Oregon. This intensive week-long session is open to students enrolled at the Corvallis, La Grande or via Ecampus. Following the field week, students complete course content in a merged Ecampus section. A Corvallis-campus based faculty member has also developed a section of rangeland-animal relations course as a field hybrid which includes tours of cattle ranches, Bureau of Land Management Wild Horse Corrals and interaction with rangeland conservationists in Oregon’s sagebrush steppe.

Results

Degree Completion

As rangeland sciences programs face declining enrollment at many educational institutions, faculty have adopted methods of program delivery to suit the twenty first century learner. Several trends are evident. Many

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students require more than the historic norm of four years to complete a degree. Others seeking professional development related to their current employment enroll in courses on a sporadic basis. This might be one course per academic year or a few courses over three-four years. Students seeking a degree in this manner are not counted in the traditional manner universities use to document student success, i.e., degree completion and years required for completion. Thus the benefits provided by the Rangeland Sciences program go unrecognized because they do not meet traditional metrics of success.

While hundreds of students have earned degrees on the Corvallis and La Grande campuses, only twenty students have earned a Bachelor of Science in Rangeland Sciences via Ecampus since its inception (Duerfeldt, 2024). All other Ecampus enrollees are post-baccalaureate or are on-campus students seeking particular faculty or flexibility in their academic schedules.

Employment of Graduates and Professional Networking

A formal record of graduate employment following the awarding of a Bachelor of Science in Rangeland Sciences (Rangeland Ecology and Management prior to 2011) is not available. However, current and retired faculty members interact with graduates and thus anecdotal information is available. Students are employed by the US Forest Service, US Bureau of Land Management, State land management agencies, land trusts and on private ranches.

Students benefit from faculty introducing them to their professional networks, particularly within the Society for Range Management. These relationships are reinforced at annual International SRM meetings such as the February 2025 meeting in Spokane, Washington. In some instances, due to Ecampus enrollment, the first face-to-face interaction between students and faculty occurs at a SRM meeting.

Discussion

Declining enrollment in the on-campus programs has challenged university administrators and teaching faculty for at least 15 years. Numerous factors contribute to this trend including faculty attrition, lack of awareness and promotion of the on-campus degree programs and competition due to other similar degree programs such as Environmental Sciences in the College of Earth, Oceanic and Atmospheric Sciences and the Natural Resources degree in the College of Forestry. Students in other degree programs take advantage of the rangeland sciences coursework to meet the breadth requirements of their degrees yet do not complete the Rangeland Sciences degree. Faculty in the Rangeland Sciences degree program report anecdotally that some students would have chosen to earn Rangeland Sciences degrees had they been aware of the opportunity earlier in their undergraduate educational career.

It is anticipated that the Ecampus program will remain a strength whether those enrolled seek a Bachelor of Science degree or enroll as post-baccalaureate students completing continuing education as part of their professional development. Because the Rangeland Sciences program provides essential content for other natural resources-related degrees at OSU, the faculty in this academic group will continue to provide relevant applied ecology education for those students.

Conclusion & Implications

Continuation of the Bachelor of Science in Rangeland Sciences degree at OSU will demand innovation, increased enrollment and collaboration across departments and with other universities. Increased use of simulations could enrich online course offerings and expansion of the field hybrid course offerings would enhance undergraduate learning with hands-on coursework.

Despite the prominent level of faculty collaboration with other universities, land management organizations and the ranching community, increased student enrollment and increased degree completion are the factors that will make the Rangeland Sciences degree program valuable to administrators who must justify its costs.

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