Institution Submitting Request: Utah Valley University
Program Title: Bachelor of Science in Botany
School or Division or Location: College of Science and Health
Department(s) or Area(s) Location: Department of Biology
Recommended Classification of Instructional Programs (CIP) Code\(^1\): 26.0301
Board of Regents’ Approval Date: 06/25/2010

Proposal Type (check all that apply):

<table>
<thead>
<tr>
<th>Section #</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.10</td>
<td>X Three-Year Follow-Up Report of Recently Approved Programs</td>
</tr>
<tr>
<td>4.3.3</td>
<td>Two-year Follow-up Report of Fast-tracked Certificate</td>
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</table>

Chief Academic Officer (or Designee) Signature:
I certify that all required institutional approvals have been obtained prior to submitting this request to the Office of the Commissioner.

Signature
Date: \text{MM/DD/YEAR}

Printed Name: Ian Wilson

\(^{1}\) CIP codes must be recommended by the submitting institution. For CIP code classifications, please see \text{http://nces.ed.gov/ipeds/cipcode/Default.aspx?y=55}
Program Description
Regents Approval: 06/25/2010

Course requirements provide students with a broad foundation in plant and related sciences in preparation for graduate or professional school or career entry. The curriculum includes formal studies in the biological topics of cell biology, genetics, ecology, conservation biology, microbiology, and evolution and the botanical topics of plant systematics, plant physiology, molecular biology, plant anatomy, plant morphology, and field botany. Required and recommended courses in mathematics, physics, chemistry, and geography complement the biological components. Degree requirements encompass a traditional liberal arts education consisting of UVU general education courses, core requirements (a minimum of 40 credits in the Biology department to include a minimum of 15 in botany courses, and a total of 40 upper division credits) plus electives.

First students admitted: Fall 2010.

Enrollment and Revenue Data

PLEASE NOTE: No new resources were requested in the R401, and no new resources were received. The degree was implemented using existing resources, courses already being offered, and existing faculty and staff.

<table>
<thead>
<tr>
<th>Departmental/Unit Enrollment and Staffing Data</th>
<th>Prior to Program Implementation</th>
<th>Year 1 2010-11</th>
<th>Year 2 2011-12</th>
<th>Year 3 2012-13</th>
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<tbody>
<tr>
<td>Total Department Student FTE (Based on Fall Third Week Data)</td>
<td>1052</td>
<td>1052</td>
<td>1220</td>
<td>1052</td>
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<tr>
<td>Total Department Faculty FTE (A-1/S-11/Cost Study)</td>
<td>27.2</td>
<td>27.2</td>
<td>34</td>
<td>27.2</td>
</tr>
<tr>
<td>Definition</td>
<td></td>
<td></td>
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<td>------------</td>
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</tr>
<tr>
<td>Student FTE per Faculty FTE (from Faculty FTE and Student FTE above)</td>
<td></td>
<td>35.88</td>
<td>35.19</td>
<td>35.29</td>
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</table>

### Program Level Data

<table>
<thead>
<tr>
<th>Total Number of Declared Majors in Program</th>
<th>X</th>
<th>15</th>
<th>6</th>
<th>30</th>
<th>15</th>
<th>45</th>
<th>24</th>
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</thead>
<tbody>
<tr>
<td>Total Number of Program Graduates</td>
<td>X</td>
<td>n/a</td>
<td>0</td>
<td>n/a</td>
<td>1</td>
<td>0</td>
<td>0</td>
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</table>

### Departmental Revenue

<table>
<thead>
<tr>
<th>Total Revenue to Department (Total of Funding Categories from R401 Budget Projection Table)</th>
<th>3,181,330</th>
<th>3,181,330</th>
<th>3,194,167</th>
<th>3,181,330</th>
<th>3,583,840</th>
<th>3,181,330</th>
<th>3,254,484</th>
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### Departmental Instructional Cost per Student Credit Hour (per Institutional Cost Study Definition)

<table>
<thead>
<tr>
<th>117.70</th>
<th>117.70</th>
<th>97.17</th>
<th>117.70</th>
<th>96.40</th>
<th>117.70</th>
<th>92.07</th>
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</table>

### Institutional Analysis of Program to Date

**Program Highlights:** Many botany and biology majors conduct research with “botany” faculty. The students have or will present posters or talks at regional and national meetings such as UCUR and NCUR. Since implementation of the degree, scholarship highlights include:

- Posters presented at UCUR and NCUR 2011:
  - Fungal Pathogens of Pinus longaeva. Benjamin Gutierrez, Peter Hill and Olga Kopp
  - Three additional students (Julie Knight, Janae Hadley, and Lara Menlove) also presented posters of their research work AT UCUR (faculty sponsor Dr. Harris)
Posters presented at NCUR 2012 (Weber State) (faculty sponsor Dr. Kopp):
• Isolation of Scytonemin, a UV-blocking compound in cyanobacteria Fremyella diplosiphon. Mark Ramirez, Taylor Jenson
• Is there morphological plasticity in Fremyella diplosiphon when exposed to low-nutrient growth media? Josh Told, Craig Cook
• Jennifer Summers "Trends in Vegetation Communities near Capitol Reef Field Station" (faculty sponsor Dr. Van Buren)
• Nick Alvarado “Capitol Reef Field Station Vegetation Research” (faculty sponsor Dr. Van Buren)
• Argyle A, Stevens MT. Overcompensation in Coleus? (supervisor Dr. M. T. Stevens)

Poster presentation at Botanical Society of America national meeting 2012:
• Analysis of the effect of different wavelengths of light in the growth of Fremyella diplosiphon. Josh Told, Craig Cook. (This data has been submitted for publication in NCUR Proceedings.)

Future Presentations accepted for UCUR 2013 (USU) (faculty sponsor Dr. Holt):

Other Completed Supervised Student Research:
• Oliver Hansen—“Henry’s Fork and vicinity: a UVU Herbarium block checklist project” (2010-11) (presented at a Biology Dept. seminar, Spring 2012 (faculty/staff sponsors Drs. Jason Alexander, Michael T. Stevens, Jim Harris)
• Robert Pyles— “Duckweed growth-determining factors” (2011-12) (supervisor Dr. M. T. Stevens)
• Robert Pyles— SAC proposal “Duckweed growth-determining factors” funded $200 (supervisor Dr. M. T. Stevens)
• Allyson Roberts—“Effects of riverbank-stabilizing vehicles on riparian tree growth and distribution along the Spanish Fork River in Utah” 2011-12 (supervisor Dr. M. T. Stevens)

Continuing Research or Activities:
• Megan Covert-vegetation monitoring at Capitol Reef Field Station (faculty sponsor Dr. Van Buren)
• Alex Argyle—Overcompensation in Coleus? (honors’ research) (supervisor Dr. M. T. Stevens
• Alex Argyle—Influence of boulders on hackberry (Celtis reticulata) growth and distribution in the Wasatch Chaparral (honors thesis) (supervisor Dr. M. T. Stevens)
• Alex Argyle—Hayward revisited: an analysis of the Wasatch Chaparral (SAC proposal, funded $1115--S1205) (supervisor Dr. M. T. Stevens)

To date, there has been one graduate from the program. This student, Benjamin Gutierrez, was accepted by Cornell University in their Plant Breeding and Genetics Program with a full scholarship from the U.S. Department of Agriculture/Agricultural Research Service (USDA-ARS) covering expenses for the full duration of his graduate school education. When he graduates, he will work for the USDA-ARS maintaining and distributing genetic resources for apples, grapes and tart cherries. That this nascent program is turning out a graduate of the caliber to successfully compete for a position at a world premier institution and to
receive a full scholarship from such a prominent government agency attests to the quality of the program even now.

The UVU Plant Identification Team just won First Place at the 2013 Utah State Competition in Cedar City. They won the competition against teams from BYU, USU, and SUU. In addition to the team win, Botany major, Megan Curtis Covert, won first place in the individual category. They will be competing at the nationals in the coming months. The Plant Identification Team has competed at the international competition sponsored by the Society for Range Management every year since 2001 and has consistently ranked in the top five at regional and national competitions. The national / international Range Science Society sponsors these competitions.

The UVU Student Botany Club currently has more than 20 active members. The club typically host guest speakers, education field trips, and service projects (such as an endangered plant inventory). The Botany Club was instrumental in establishing the UVU Native Plant Garden (located north of the Environmental Technology Building), which has been recognized as a Utah Heritage Site by the Utah Native Plant Society. This is a valuable resource for both course and community education.

Enrollments:

Strengths: The number of declared botany majors has gradually and steadily increased over the two and a half years since Regents’ approval. The number has risen from about four in Aug 2010 to 24 in Jan 2013. This indicates an increasing interest in the discipline in spite of an institutional enrollment decrease. Also, some biology majors who expressed an interest in the botany BS chose to remain in the biology BS program in order to graduate in the traditional four years. Several BOT courses are very popular (e.g., BOT 2050, BOT 2100) and are always at capacity with a waiting list. Most other BOT course are usually at or near capacity when offered. In addition to botany and biology majors, these courses attract students with majors in other colleges (e.g., English, Music, Accounting).

All Departmental majors take the Major Field Assessment Test (MFAT) during their senior year as one assessment tool. Botany majors score as well on this assessment test as all other students within the department. Departmental scores are consistent with national averages.

Weaknesses: The number of majors has not increased as much as initially anticipated. The R401 numbers were based on surveys of biology majors and others enrolling in biology and botany courses. Lower enrollments in higher education overall, resource limited recruitment, and a more visible and popular health professions oriented curriculum have all played a part in the slowed growth of the program. Even so, the trajectory has been consistently positive, approximately doubling for each year the program has been in existence.

Actions: The Department has been working with departmental advisers to improve recruitment activities. By way of example, there were botany representatives at the Biology table at the UCCU Family Festival during Fall 2012 and 2013, and the Botany graduate listed above will be one of the featured students in upcoming promotional materials for the Biology Department. If the current trajectory holds, by next year the actual enrollments will surpass those predicted for the current year’s enrollment level, meaning that the program is only off its target numbers by a single academic year.
Staffing:

**Strengths:** The degree was requested and implemented using existing resources, courses, faculty, and staff in order to meet student interest and to emphasize plant biology within the larger biological context.

The majority of enrollees in BOT courses are not botany majors. These courses and their facilities serve the entire Department, College, and University. Enrollments of non-botany majors in BOT courses have been increasing. The “botany faculty” teach or have taught a variety of departmental courses (not just BOT courses), e.g., BIOL 1010, 1610, 1620, 202R, 204R, 2500, 3400, 3700, 3800, 4200, 4500, 481R, 489R, 490R, 494R, 499R, 525R. The vast majority of students taught by “botany faculty” are not botany majors. Thus, the botany faculty contribute significantly to general education courses and several other degree programs (BIOL AA/AS, BS, BIOL ED BS, INTEGRATED STUDIES BA/BS, BIOTECH BS, CHEM BS Emphasis in Biochemistry and Emphasis in Forensic Chemistry).

**Weaknesses:** The new greenhouse atop the newly built science building at UVU nearly triples the amount of growing capacity available to the program. Consequently, the number of undergraduate research projects has grown substantially. This, coupled with the fact that there now exists the ability to more precisely control climate conditions within the new greenhouse, allows for more delicate species to be grown, which require greater oversight than the plants previously being grown. The workload is currently being placed on the Botany Lab Manager, but in order to manage the facility’s increasing demands, a Greenhouse Manager will be needed to keep the process moving forward, but there are no current funds available for hiring someone into this position.

**Actions:** The request for this position is being delayed until the increase in workload on the Botany Lab Manager becomes untenable.

Funding/Infrastructure:

**Strengths:** In addition to the new greenhouse, the UVU Biology Department houses an internationally recognized herbarium which has been used extensively in teaching and student research. The on-line “Virtual Herbarium” stands as a model for other herbaria. Experiences with this facility enhance students’ credentials for graduate school and opportunities for employment (especially with agencies such as the Bureau of Land Management).

**Weaknesses:** The cost of field trips for the field botany classes is the major funding concern for the botany program. The program faculty strongly believes in the value to students of these field trips and the department has been supporting this effort through cost savings in other areas.

**Actions:** The botany program is requesting to increase the baseline budget to include such activities in this year’s PBA cycle and will be looking into raising student fees to cover the costs of the field trips on a forward basis. Equity issues will also be pursued, as it appears that UVU is being charged more money for state motor pool rentals than its sister institutions for trips of similar distance to identical locations. Additionally, the Biology department, in co-ordination with Development personnel, is pursuing funding and plant donations from local plant-related business to augment institutional resources.
Employment Information:

**Strengths:** One Botany B.S. graduate has been accepted into a Ph.D. program with full scholarship (see above). At least one Biology B.S. graduate (Nick Alvarado, 2012) having completed nearly all the botany requirements, has submitted applications to the BYU graduate programs in plant sciences. Several agencies (Bureau of Land Management) and non-governmental organizations such as the Nature Conservancy have requested that UVU botany majors apply. Majors are also being encouraged to apply for available internships at Capitol Reef National Park (location of the UVU Field Station) which are funded by the National Park Service and its affiliates.

**Weaknesses:** Since the degree has been in place for a relatively short period of time, most declared botany majors have had insufficient time to complete the degree requirements, making employment numbers artificially low at the moment. A couple of students who are technically seniors are delaying graduation in order to meet program requirements and thus hold the B.S. in Botany.

**Actions:** The Department is actively discussing student internship possibilities with state and federal agencies and the private sector in addition to those listed above. Internships may lead to employment after graduation.

<table>
<thead>
<tr>
<th>Term Graduated</th>
<th>Graduate School</th>
<th>Employed in Field</th>
<th>Employed Other</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010/2011</td>
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<td>Program</td>
<td>Graduates</td>
<td>Yet</td>
</tr>
<tr>
<td>2011/2012</td>
<td>1 Cornell University</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2011/2013</td>
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<td>Program</td>
<td>Graduates</td>
<td>This Year</td>
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