Curriculum Assessment Report: Sustainable Food & Bioenergy Systems (SFBS) Degree Program

June 2017: Mary Stein, SFBS Program Leader

SFBS is an interdisciplinary and inter-college program at MSU involving faculty and coursework in four core departments:
Health and Human Development (HHD), Plant Sciences and Plant Pathology (PSPP), Land Resources and Environmental Sciences (LRES), and Animal and Range Sciences (ANRS)

Students choose from the following curricular options:

Sustainable Food Systems (HHD)  CORE FACULTY
M. Stein, C. Byker-Shanks, S. Ahmed
Sustainable Crop Production (PSPP)  B. Dyer, M. Burgess
Agroecology (LRES)  B. Maxwell, P. Miller
Sustainable Livestock Production (ANRS)  P. Hatfield

Learning Outcomes

Students who graduate with a degree in SFBS will:

1. Be capable of systems thinking. This will be demonstrated by using vocabulary appropriately, and analyzing issues, problems and subsystems using a systems approach and an interdisciplinary perspective.
2. Have problem solving skills. This will be demonstrated in experiential coursework, internships, and in team projects in upper division coursework.
3. Have practical skills. For example, students will know how to produce, distribute, and market food in addition to skills specific to a chosen career path, and have an appreciation for the importance of service learning.
4. Be capable of critical thinking. For example, students will evaluate scientific and popular literature, generate investigative questions, understand implications of current events, evaluate sources of information for accuracy and bias, apply current scientific information to research projects, and understand power relationships in the dissemination of knowledge.
5. Be effective communicators. Students will develop effective oral communication skills, effective written communication skills, and develop effective and professional nonverbal communication skills.
6. Have developed agency, or the capacity to make choices and act in a society framework. For example, students will learn how to advocate a position, will be empowered and confident, will be entrepreneurial, be able to identify their own values, and act like professionals.
7. Have a body of knowledge related to SFBS concepts. For example, through courses in a variety of disciplines, students will understand key concepts in human nutrition, food systems, bioenergy, ecology, economics, sustainability, plant science, crop science, animal science, food security, food safety, community supported agriculture, policy etc.

### Curriculum Map

<table>
<thead>
<tr>
<th>SFBS COURSES</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 146: Introduction to SFBS</td>
<td>I I I I I</td>
</tr>
<tr>
<td>SFBS 296/298: THG Practicum/Internship</td>
<td>D D I,D D I I D</td>
</tr>
<tr>
<td>SFBS 498/ANSC 498: Internship</td>
<td>D D,M M D,M M D D</td>
</tr>
<tr>
<td>SFBS 499: SFBS Capstone</td>
<td>M M M M D,M</td>
</tr>
<tr>
<td><strong>SUPPORTING COURSES FOR ALL OPTIONS</strong></td>
<td><strong>OUTCOMES</strong></td>
</tr>
<tr>
<td>BIOB 110: Intro to Plant Biology</td>
<td>I I I D</td>
</tr>
<tr>
<td>ECNS 101IS: Economic Way of Thinking</td>
<td>I I I D</td>
</tr>
<tr>
<td>NUTR 221CS: Human Nutrition</td>
<td>I I I D</td>
</tr>
<tr>
<td>NUTR 226: Food Fundamentals (ANSC316 for Sustainable Livestock Production Option)</td>
<td>I I I I D</td>
</tr>
<tr>
<td>ECHM 205CS: Energy &amp; Sustainability</td>
<td>I D I D</td>
</tr>
<tr>
<td>ENSC 245IN: Soils</td>
<td>I D D D D D</td>
</tr>
<tr>
<td>AGSC 341: Field Crop Production</td>
<td>D D D D D D</td>
</tr>
<tr>
<td>NUTR 351: Nutrition and Society</td>
<td>D D D D D D</td>
</tr>
</tbody>
</table>

- **Introduce (I)**
- **Develop (D)**
- **Mastery (M)**

### Student Performance: Data Sources

<table>
<thead>
<tr>
<th>SFBS COURSES</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 296/298: THG Practicum/Internship</td>
<td>X X X</td>
</tr>
<tr>
<td>SFBS 498/ANSC 498: SFBS Internship</td>
<td>X X</td>
</tr>
<tr>
<td>SFBS 499: SFBS Capstone</td>
<td>X X X X X X X</td>
</tr>
</tbody>
</table>
## Performance Thresholds for Learning Outcomes

<table>
<thead>
<tr>
<th>OUTCOMES</th>
<th>COURSE INSTRUCTOR</th>
<th>PERFORMANCE THRESHOLD</th>
<th>ASSESSMENT SCHEDULE</th>
<th>2016-2017 OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Be capable of <em>Systems Thinking</em>.</td>
<td>SFBS 499: Capstone Stein</td>
<td>80% of students score “B” or better on Systems Thinking Paper</td>
<td>Fall Semester</td>
<td>75% at performance threshold or above</td>
</tr>
<tr>
<td><strong>2</strong> Have problem solving skills.</td>
<td>SFBS 296: THG Practicum Burgess</td>
<td>80% of students complete skill building self-assessment with a positive response</td>
<td>Summer Session</td>
<td>Date available</td>
</tr>
<tr>
<td><strong>3</strong> Have practical skills.</td>
<td>SFBS 296: THG Practicum Burgess</td>
<td>80% of students complete skill building self-assessment with a positive response</td>
<td>Summer Session</td>
<td>Date available</td>
</tr>
<tr>
<td><strong>4</strong> Be capable of <em>critical thinking</em>.</td>
<td>SFBS 499: Capstone Stein</td>
<td>80% of students score “B” or better on Systems Thinking Paper</td>
<td>Fall Semester</td>
<td>75% at performance threshold or above</td>
</tr>
<tr>
<td><strong>5</strong> Be effective <em>communicators</em>.</td>
<td>SFBS 499: Capstone Stein</td>
<td>80% of students score a “B” or better for Professional Communication</td>
<td>Fall Semester</td>
<td>92% at performance threshold or above</td>
</tr>
<tr>
<td><strong>6</strong> Have developed agency.</td>
<td>SFBS 296: THG Practicum Burgess</td>
<td>80% of students complete skill building self-assessment with a positive response</td>
<td>Summer Session</td>
<td>Date available</td>
</tr>
<tr>
<td><strong>7</strong> Have a body of <em>knowledge</em> related to SFBS concepts</td>
<td>SFBS 499: Capstone Stein</td>
<td>80% of students score “B” or better on Systems Thinking Paper</td>
<td>Fall Semester</td>
<td>75% at performance threshold or above</td>
</tr>
</tbody>
</table>
Process for Assessing the Data

SFBS Annual Assessment Process

1. All data will be collected as part of the regularly planned grading as outlined within the class syllabi or as part of course assessment using student surveys.
2. Summary data will be provided by individual SFBS course instructors to the SFBS Program Leader following the posting of final grades each Fall Semester and Summer Session.
3. The SFBS Program Leader will compile the summary data and present the results to the SFBS faculty for review at the beginning of each Fall semester.
4. The SFBS faculty will review the assessment results, and makes decisions on how to respond.
   - If a performance threshold was not met, the SFBS faculty may choose to:
     - Continue to gather additional data for another 1-2 semesters to verify or refute the result.
     - Change something within the curriculum to try to fix the problem.
     - Change the limit of the performance threshold.
     - Redefine the performance outcome.
     - Not change anything.
   - If a performance threshold was met, the SFBS faculty can still choose to modify any aspect of the assessment plan.
5. A summary of the year’s assessment activities and faculty decisions will be reported to the Provost’s Office in the HHD Department’s Annual Assessment Activities report.

Detailed Program Assessment Report:

College: MULTI (EHHD & Agriculture)
Program Name: MULTI: BS: Sustainable Food and Bioenergy Systems
Level: Undergraduate
Degree: BS
Type: Major
Year: 2017
Submitted by: Mary Stein
Submitter Email: mary.stein@montana.edu
Date submitted: June 19, 2017
Question 1: What was done on assessment this year?

Based on our assessment plan, we evaluated program learning outcomes 1-7 during the 2016-17 academic year. These learning outcomes are:

1. Be capable of systems thinking.
2. Have problem solving skills.
3. Have practical skills.
4. Be capable of critical thinking.
5. Be effective communicators.
6. Have developed agency, or the capacity to make choices and act in a society framework.
7. Have a body of knowledge related to SFBS concepts.

Question 2: What assessment data were collected?

1. For the assessment of systems thinking, students’ performance on systems thinking paper assignment was evaluated within the capstone course (SFBS499).
2. For the assessment of problem solving skills, skill building self-assessment data was gathered from students during the practicum course (SFBS296) field tour group discussions and weekly field course quizzes.
3. For the assessment of practical skills, skill building assessment data was gathered through faculty observation, weekly quiz performance and individual project presentations in the practicum course (SFBS296). Additionally, mentor reviews from the internship course (SFBS498) are also used to report practical skills performance.
4. For the assessment of critical thinking, the systems thinking paper within the capstone course was evaluated (SFBS499).
5. For the assessment related to becoming an effective communicator, the capstone course (SFBS499) oral presentations (in-class presentation of poster, presentation of poster at state-wide summit, and systems paper presentation) were evaluated.
6. For the assessment of agency, the practicum course (SFBS296) skill building self-assessment, the internship course (SFBS498) feedback from mentors, and the capstone course (SFBS499) team project performance was evaluated.
7. For the assessment of body of knowledge, the systems thinking paper within the capstone course (SFBS499) was evaluated.

Question 3: What was learned from the assessment?

1. Systems thinking: 75% of the students scored at or above the threshold value for this learning outcome. This was a decline from the previous year’s outcome. The course instructor for the capstone class (SFBS499) changed between 2016 and 2017, which could account for a different approach to grading for the systems paper project, upon which this value is based. Additionally, the class size in 2017 was 12 students, whereas it was 25 in 2016, increasing each individual student’s impact on overall class performance.

2. Problem solving skills: Data for the practicum course (SFBS296) will become available in August 2017, therefore is not included in this iteration of the curriculum assessment report. The report will be updated when this data is available. 75% of the students in the capstone course (SFBS499) scored at or above our threshold value for this learning outcome. With a performance threshold of 80% for this outcome, students are slightly underperforming in this area.

3. Practical skills: Data for the practicum course (SFBS296) and the internship (SFBS498) will become available in August 2017, therefore is not included in this iteration of the curriculum assessment report. The report will be updated when this data is available.

4. Critical thinking: 75% of students in the capstone course (SFBS499) scored at or above the threshold value for this learning outcome, based on performance on the systems paper assignment.

5. Effective communicator: 92% of students in the capstone course (SFBS499) scored at or above the threshold value for this learning outcome, based on performance on three assignments (in-class presentation of poster, presentation of poster at state-wide summit, and systems paper presentation).

6. Agency: Data for the practicum course (SFBS296) and the internship (SFBS498) will become available in August 2017, therefore is not included in this iteration of the curriculum assessment report. The report will be updated when this data is available. 75% of students in capstone course
(SFBS499) performed at or above the threshold value for this learning outcome, based on their successful engagement and completion of the team project assignment.

7. Body of knowledge: 75% of the students in the capstone course (SFBS499) performed at or above the threshold level for this learning outcome, based upon their performance on the systems paper assignment.

**Question 4: How did you respond to the assessment results:**

Based upon the program assessment data available to date (June, 2017) SFBS students met or exceeded performance threshold in one of the seven learning outcomes (“Be effective communicators”) and did not meet the performance threshold on three of the seven learning outcomes (“Be capable of systems thinking”, “Be capable of critical thinking”, and “Have a body of knowledge related to SFBS concepts”). We are still awaiting data from summer 2017 courses for the remaining three learning outcomes (“Have problem solving skills”, “Have practical skills” and “Have developed agency”). The full report will be updated in August 2017 when this data becomes available.

The SFBS core faculty will meet in late August 2017 to review the complete curriculum assessment report and come up with a strategy for improving student learning outcomes in future years. The program leader would like to have the core faculty consider the following relative to an improved curriculum assessment plan: Perhaps the curriculum assessment plan does not cast a wide enough net across SFBS courses to accurately assess student learning outcomes. For example, the three learning outcomes in which students did not meet the performance threshold were based on just two assignments in the capstone course (SFBS499). To more accurately assess these learning outcomes, it is recommended that any individual assignment be linked to only one learning outcome, and, where possible, multiple assignments from two or more courses contribute to the calculated performance threshold score of a single learning outcome. This approach will increase accuracy of the program assessment by minimizing individual instructor bias, avoiding excessive weighting of performance on a single assignment and minimizing possible comparative data skewing due to a small size (ie, unusually small class size, as was experienced in the 2016 fall capstone course (SFBS499)).