UC Berkeley's Sustainability Curriculum & the UN Sustainable Development Goals

SUSTAINABLE DEVELOPMENT GOALS

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Table of Contents

Executive Summary 1
- Purpose and Goals
- Overview of Findings

Methodology 3
- UC Berkeley's Inventory of Sustainability Courses
- Identifying Keywords
- Mapping by UN SDGs
- Notice on Methodology

Findings 6
- Overview of Data
- Environmental Sustainability Courses
- Social and Economic Sustainability Courses
- Environmental and Social/Economic Sustainability Courses
- All STARS Courses

Conclusion 12

Executive Summary

Purpose and Goals

The IARU Student Chapter* at the University of California, Berkeley partnered with the UC Berkeley Office of Sustainability to further explore UC Berkeley's role as an institute of higher education in promoting the United Nations Sustainable Development Goals (SDGs).

This course list mapping is an extension of UC Berkeley's Inventory of Sustainability Courses, a project that was completed by the UC Berkeley Office of Sustainability in January of 2019. The IARU Student Chapter at UC Berkeley was inspired to expand on the findings of over 600 sustainability courses by mapping the list to the United Nations Sustainable Development Goals (SDGs).

*Also known as the Students for Environmental Advocacy and Global University Leadership on Sustainability (SEAGULS)

Goals

- Identify the strengths and weaknesses of UC Berkeley sustainability curriculum in terms of UN SDG relevancy
- Research and raise awareness of the role that higher education universities should play in advancing the UN SDGs

Overview of Findings

The IARU Student Chapter found that every UN SDG is covered by UC Berkeley's STARS coursework, with some being more represented than others. Figure 1 shows the number of courses for each SDG, divided among aggregate, primary, and related. Based on the data, UC Berkeley covers UN SDG 16 (Peace and Justice) thoroughly, with about 22% of the courses being primarily and secondarily related. The weakest UN SDG represented in UC Berkeley's sustainability curriculum was SDG 4 (Quality Education), with only .4% of the courses being at all related. It is important to note that this data is based on the previously filtered STARS assessment and thus does not adequately represent UC Berkeley's full curriculum.

UN SDG #	All Courses		
	Agg. Course Count	Primary	Related
1 (No Poverty)	14	5	9
2 (Zero Hunger)	27	15	12
3 (Good Health)	55	40	15
4 (Quality Education)	5	5	0
5 (Gender Equality)	23	5	18
6 (Clean Water and Sanitation)	62	18	44
7 (Renewable Energy)	78	50	28
8 (Good Jobs and Economic Growth)	57	27	30
9 (Innovation and Infrastructure)	103	54	49
10 (Reduce Inequalities)	70	25	45
11 (Sustainable Cities and Communities)	83	48	35
12 (Responsible Consumption)	73	39	34
13 (Climate Action)	78	26	52
14 (Life Below Water)	34	14	20
15 (Life on Land)	114	65	49
16 (Peace and Justice)	252	147	105

Figure 1. Table breakdown of the number of courses for each SDG, divided among aggregate, primary, and related.

Methodology

UC Berkeley's Inventory of Sustainability Courses

The IARU Student Chapter used UC Berkeley's inventory of sustainability courses as the baseline of which courses to map by UN SDG. The courses on the sustainability course inventory are from 2015-2016, 2016-2017 and 2017-2018 school years.

UC Berkeley's sustainability course list was developed for the Sustainability, Tracking, Assessment & Rating System (STARS) in 2018. STARS is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance. Hundreds of institutions use STARS criteria for tracking their sustainability efforts - UC Berkeley among them.

UC Berkeley's inventory of sustainability courses is split into three lists based on the categories STARS uses for defining sustainability courses:

1. Courses that only address environmental sustainability issues (386 total). Examples include the study of climate systems.
2. Courses that address social and economic sustainability issues (148 total). Examples include the history of labor unions.
3. Courses that address social, economic & environmental sustainability (73 total). Examples include climate-related migration studies.

Some courses are Sustainability Focused (SF), meaning their central theme involves sustainability issues. Other courses are not sustainability-focused but contain Sustainability Material (SM), with one or more modules on sustainability. The course categories are noted as SF or SM in a dedicated column.

Identifying Keywords

This project was largely inspired by research completed by the University of Toronto students, titled "Expanding Student Engagement in Sustainability: Using SDG- and CEL-Focused Inventories to Transform Curriculum at the University of Toronto." The research detailed three comprehensive inventories developed by the student researchers, one of which mapped sustainability courses by the UN Sustainable Development Goals. The student team at UC Berkeley drew heavily upon the University of Toronto research in identifying keywords from which to map the UN SDGs.

Following the same logic presented by the University of Toronto, UN SDG Goal 17 was excluded from our course mapping. SDG 17 focuses on strengthening partnerships for the

goals and does not address a new perspective of sustainability, making the goal poorly-fitted for our purposes.

Goal	SDG	Keywords[1]
1	No Poverty	poverty, income distribution, wealth distribution, socioeconomic
2	Zero Hunger	agriculture, food, nutrition, hunger
3	Good Health and Well Being	health, well being, mortality, death, disease
4	Quality Education	educat*[2], inclusive, equitable, school
5	Gender Equality	gender, women, equality, girl, queer, female, femin-(ine, ism)
6	Clean Water and Sanitation	water, sanitation, wastewater, drought, rivers, aquifers, wetlands, oceans, marine, hydro-(logy), groundwater
7	Affordable and Clean Energy	energy, renewable, wind, solar, geothermal, hydroelectricity, energy efficiency, electricity
8	Decent Work and Economic Growth	employment, economic growth, sustainable development, labor, worker, wage, GDP, economic
9	Industry Innovation	infrastructure, innovation, industr*, buildings
10	Reduce Inequality	trade, inequality, financial market (0), tax*
11	Sustainable Cities and Communities	cities*, urban, resilien*, rural
12	Responsible Consumption and Production	consum*, production, waste, natural
13	Climate Action	climate, greenhouse gas, environment, global warming, weather, water, natural resource
14	Life Below Water	ocean, marine, water, pollut*, conserv*, fish, sea
15	Life on Land	forest, biodiversity, ecology, pollut*, conserv*, land use
16	Peace, Justice, and Strong Institutions	institution, justice, governance, peace, rights, policy, development

Figure 2. Table showing the keywords used to map the course curriculum by UN SDGs.

[1] Keywords listed in red are additional terms developed by the UC Berkeley team, not included in the original set of keywords acquired from the University of Toronto research

[2] An asterisk next to an abbreviated word is syntax for the search engines used to search all variants of that abbreviation. For example, searching pollut* returns pollution, polluter, pollutants, polluted, and polluter.

Mapping by UN SDGs

The team categorized 613 courses from over 47 departments - ranging from Public Health to Law.

First, the IARU Student Chapter completed a keyword search of UC Berkeley's inventory of sustainability courses. After identifying relevant courses based on the keyword search, each course description was then reviewed and mapped according to its relevance to the UN SDGs. For standardization and guidance, the team used the UN's online descriptions of SDGs as the basis for course alignment and categorization.

Using Google Sheets, courses were mapped by at least one primary SDG (marked 'xp') and potentially several secondary/related SDGs (marked 'x'). Data collection consisted of adding up the number of courses mapped to each SDG under a 'primary' or 'related' basis.

Notice on Methodology

This assessment of UC Berkeley's curriculum relevance according to the UN Sustainable Development Goals is not fully comprehensive.

First, the foundation of this project was based on the Office of Sustainability's previous inventory of UC Berkeley sustainability courses, which used STARS criteria to identify sustainability-focused and sustainability-related courses. The UN SDGs do not operate on the same criteria, and there are expected discrepancies between the two lists in terms of what is considered "sustainable."

For example, UN SDG 5 on gender equality may show up much more frequently in a different assessment of UC Berkeley's full course inventory. The STARS sustainability criteria may not have fully accounted for all courses that advance the mission of gender equality; thus, these courses were not included in the sustainability course inventory and not mapped according to the UN SDGs in this specific project.

Findings

Figure 3 illustrates the percentages of all courses that fall under each UN SDG. Although every UN SDG was covered by the UC Berkeley STARS course list, some SDGs were more represented than others, with UN SDG: 16 Peace and Justice being the most represented at 22%, UN SDG 15: Life on Land being the second most represented at 10.1%, and UN SDG: 9 Innovation and Infrastructure being the third most represented at 9.1%. The UN SDGs that were the most underrepresented in the UC Berkeley STARS course list were UN SDG 5: Gender Equality, UN SDG 1: No Poverty, and UN SDG: 4 Quality Education, represented at 2.0%, 1.2%, and .4%, respectively.

Figure 3. Waffle chart showing the percentage representation of each SDG for all courses.

Overview of Data

Below, Figure 4 shows the complete chart for the number of courses, divided by environmental sustainability, social economic sustainability, social/economic and environmental sustainability courses, and the combined course list.

	Enviro Courses			ES Courses			Enviro + ES Courses			All Courses		
SDG #	Agg. Count	Primary Count	Related Count	Agg. Count	Primary Count	Related Count	Agg. Count	Primary Count	Related Count	Agg. Count	Primary Count	Related Count
SDG 1	1	0	1	9	5	4	4	0	4	14	5	9
SDG 2	18	9	9	3	3	0	6	3	3	27	15	12
SDG 3	26	22	4	17	11	6	12	7	5	55	40	15
SDG 4	0	0	0	5	5	0	0	0	0	5	5	0
SDG 5	2	0	2	15	4	11	6	1	5	23	5	18
SDG 6	58	18	40	1	0	1	3	0	3	62	18	44
SDG 7	74	49	25	0	0	0	4	1	3	78	50	28
SDG 8	28	12	16	18	7	11	11	8	3	57	27	30
SDG 9	78	44	34	7	3	4	18	7	11	103	54	49
SDG 10	7	4	3	53	20	33	10	1	9	70	25	45
SDG 11	44	27	17	11	6	5	28	15	13	83	48	35
SDG 12	65	35	30	2	1	1	6	3	3	73	39	34
SDG 13	74	25	49	0	0	0	4	1	3	78	26	52
SDG 14	34	14	20	0	0	0	0	0	0	34	14	20
SDG 15	107	64	43	0	0	0	7	1	6	114	65	49
SDG 16	105	44	61	105	79	26	42	24	18	252	147	105

Figure 4. Table showing the course count for each category defined by the STARS list corresponding to a particular UN SDG.

Figure 4 was made by counting the number of courses that had a particular UN SDG as its primary SDG or secondary SDG, listed in the primary count columns and related count columns respectively. The aggregate count column was calculated by adding the sum of the primary and related course count and is primarily used to calculate prevalence of each SDG by percentage.

The “All Courses” column is the accumulation of the values for the environmental sustainability courses, economic/social sustainability courses and environmental + economic/social sustainability courses. Each of its columns was found by summing the values of the respective columns for each of the three categories. For example, adding together the aggregate count values for a particular SDG across the three columns will result in the aggregate count for the “All Courses” column.

Environmental Sustainability Courses

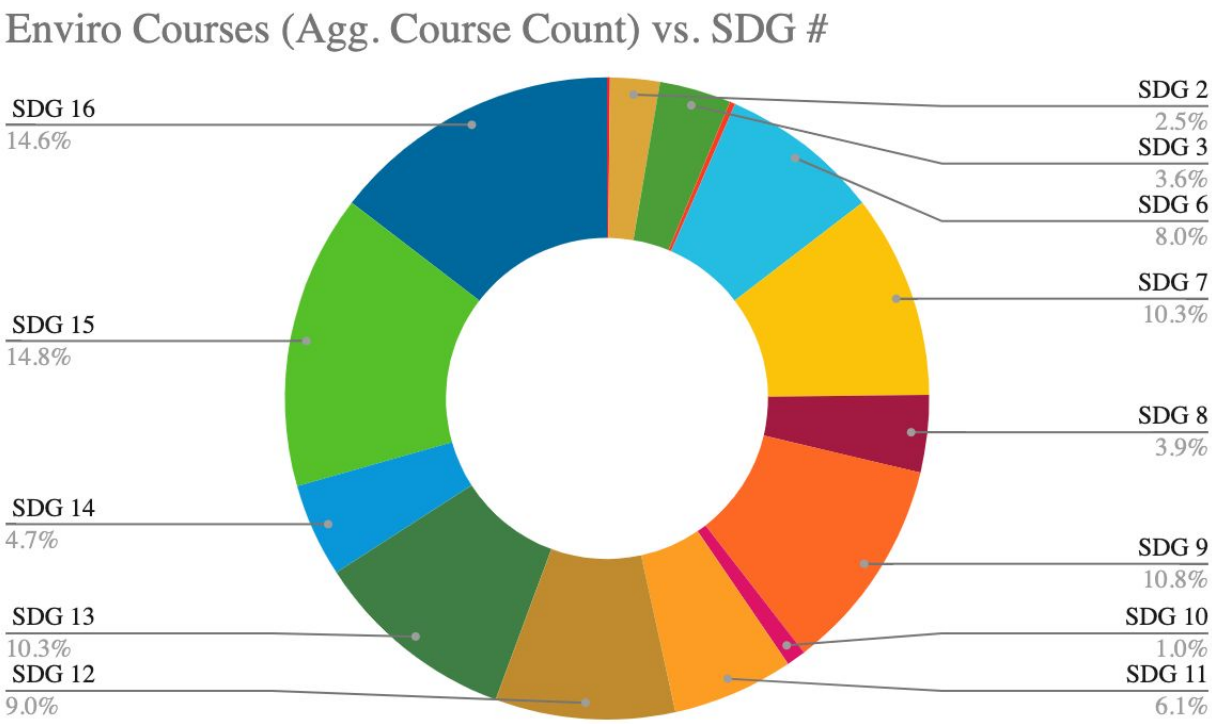

Figure 5. Pie chart showing the percentage representation of each SDG for the environmental sustainability courses.

The rankings for both primary and related UN SDGS for environmental sustainability courses in decreasing order of prevalence are as follows:

1. SDG 15 - Life on Land: (14.84%)
2. SDG 16 - Peace, Justice and Strong Institutions: (14.56%)
3. SDG 9 - Industry, Innovation and Infrastructure: (10.81%)
4. SDG 7 - Affordable and Clean Energy: (10.26%)
5. SDG 13 - Climate Action: (10.26%)
6. SDG 12 - Responsible Consumption and Production: (9.01%)
7. SDG 6 - Clean Water and Sanitation: (8.04%)
8. SDG 11 - Sustainable Cities and Communities: (6.10%)
9. SDG 14 - Life Below Water: (4.72%)
10. SDG 8 - Decent Work and Economic Growth: (3.88%)
11. SDG 3 - Good Health and Well-being: (3.6%)
12. SDG 2 - Zero Hunger: (2.49%)
13. SDG 10 - Reduced Inequality: (.97%)
14. SDG 5 - Gender Equality: (.27%)
15. SDG 1 - No Poverty: (.13%)
16. SDG 4 - Quality Education: (0%)

Social and Economic Sustainability Courses

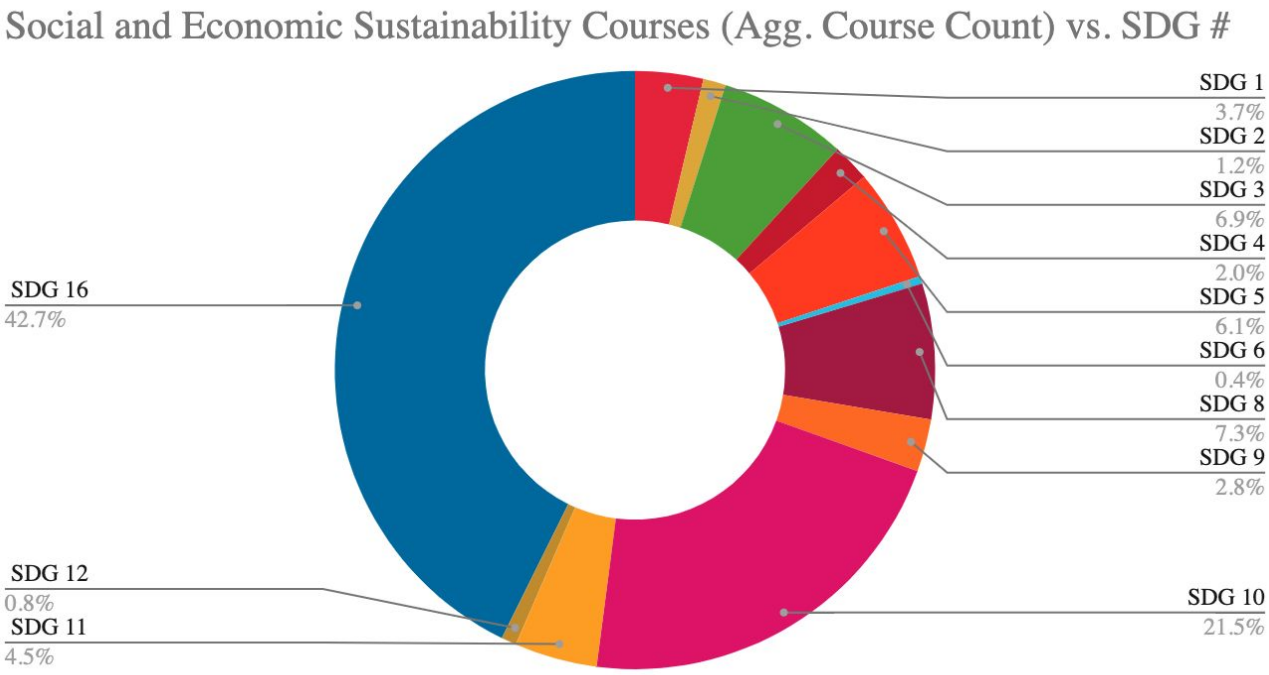

Figure 6. Pie chart showing the percentage representation of each SDG for the social and economic sustainability courses.

The rankings for both primary and related UN SDGS for social and economic sustainability courses in decreasing order of prevalence are as follows:

1. SDG 16 - Peace, Justice and Strong Institutions: (42.68%)
2. SDG 10 - Reduced Inequality: (21.54%)
3. SDG 8 - Decent Work and Economic Growth: (7.31%)
4. SDG 3 - Good Health and Well-being: (6.91%)
5. SDG 5 - Gender Equality: (6.09%)
6. SDG 11 - Sustainable Cities and Communities: (4.47%)
7. SDG 1 - No Poverty: (3.65%)
8. SDG 9 - Industry, Innovation and Infrastructure: (2.84%)
9. SDG 4 - Quality Education: (2.03%)
10. SDG 2 - Zero Hunger: (1.21%)
11. SDG 12 - Responsible Consumption and Production: (.813%)
12. SDG 6 - Clean Water and Sanitation: (.41%)
13. SDG 15 - Life on Land: (0%)
14. SDG 14 - Life Below Water: (0%)
15. SDG 13 - Climate Action: (0%)
16. SDG 7 - Affordable and Clean Energy: (0%)

Environmental and Social/Economic Sustainability Courses

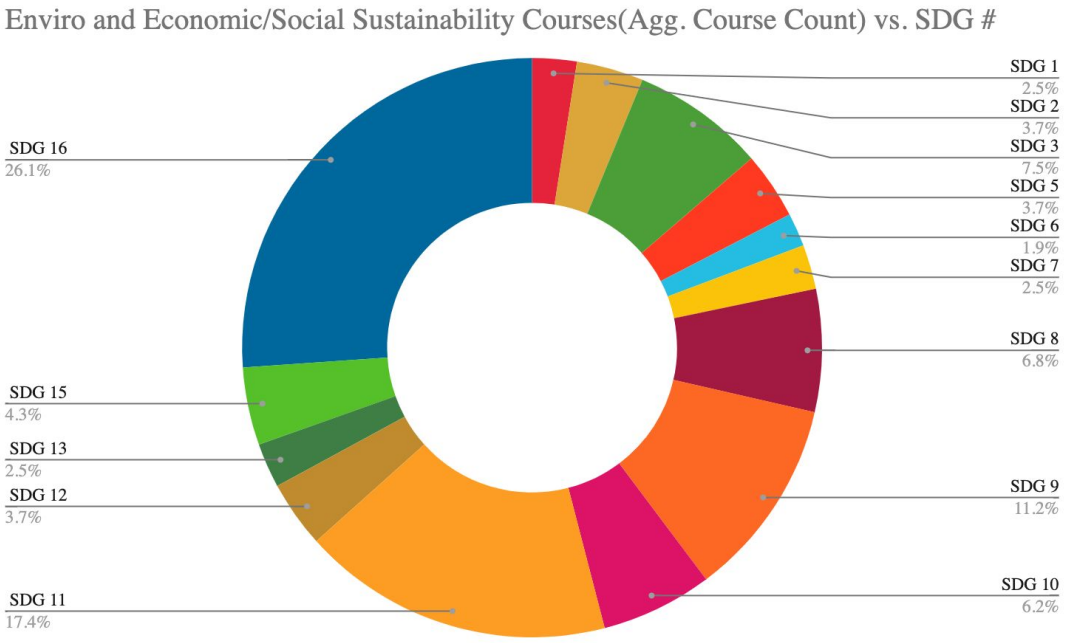

Figure 7. Pie chart showing the percentage representation of each SDG for the environmental sustainability and social/economic sustainability courses.

The rankings for both primary and related UN SDGS for environmental and economic/social sustainability courses in decreasing order of prevalence are as follows:

1. SDG 16 - Peace, Justice and Strong Institutions: (26.08%)
2. SDG 11 - Sustainable Cities and Communities: (17.39%)
3. SDG 9 - Industry, Innovation and Infrastructure: (11.18%)
4. SDG 3 - Good Health and Well-being: (7.45%)
5. SDG 8 - Decent Work and Economic Growth: (6.83%)
6. SDG 10 - Reduced Inequality: (6.21%)
7. SDG 15 - Life on Land: (4.34%)
8. SDG 2 - Zero Hunger: (3.72%)
9. SDG 5 - Gender Equality: (3.72%)
10. SDG 12 - Responsible Consumption and Production: (3.72%)
11. SDG 1 - No Poverty: (2.48%)
12. SDG 7 - Affordable and Clean Energy: (2.48%)
13. SDG 13 - Climate Action: (2.48%)
14. SDG 6 - Clean Water and Sanitation: (1.86%)
15. SDG 4 - Quality Education: (0%)
16. SDG 14 - Life Below Water: (0%)

All STARS Courses

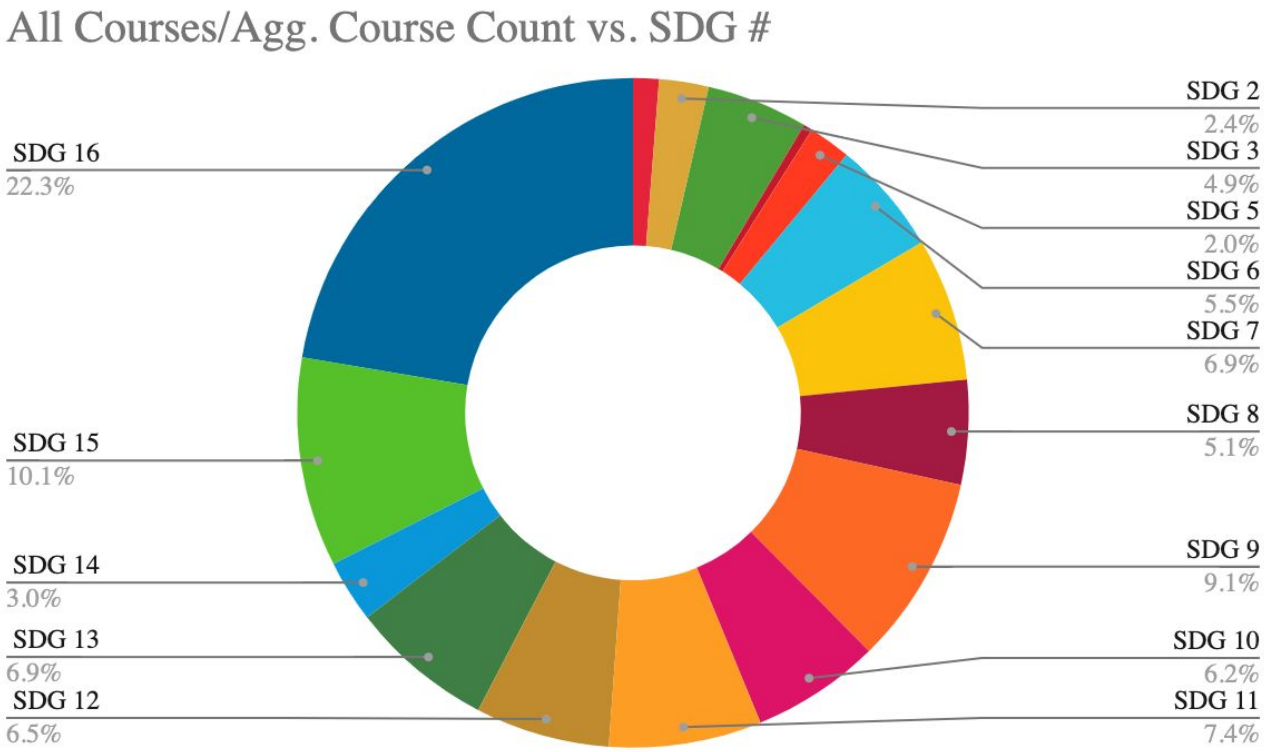

Figure 8. Pie chart showing the percentage representation of each SDG for all sustainability courses.

The rankings for both primary and related UN SDGS for all courses in decreasing order of prevalence are as follows:

1. SDG 16 - Peace, Justice and Strong Institutions: (22.3%)
2. SDG 15 - Life on Land: (10.1%)
3. SDG 9 - Industry, Innovation and Infrastructure: (9.1%)
4. SDG 11 - Sustainable Cities and Communities: (7.4%)
5. SDG 13 - Climate Action: (6.9%)
6. SDG 7 - Affordable and Clean Energy: (6.9%)
7. SDG 12 - Responsible Consumption and Production: (6.5%)
8. SDG 10 - Reduced Inequality: (6.2%)
9. SDG 6 - Clean Water and Sanitation: (5.5%)
10. SDG 8 - Decent Work and Economic Growth: (5.1%)
11. SDG 3 - Good Health and Well-being: (4.9%)
12. SDG 14 - Life Below Water: (3.0%)
13. SDG 2 - Zero Hunger: (2.4%)
14. SDG 5 - Gender Equality: (2.0%)
15. SDG 1 - No Poverty: (1.2%)
16. SDG 4 - Quality Education: (.4%)

Conclusion

This research was conducted in order to investigate the distribution of the United Nations Sustainable Development Goals within the UC Berkeley sustainability curriculum, as well as identify SDG topics in which the course inventory is lacking. Next steps include meeting with university faculty and staff to review the methodology used for this project, address the sustainability curriculum's uneven coverage of the UN SDGs, and provide guidance for university efforts to promote a comprehensive SDG education.

The IARU Student Chapter at UC Berkeley also plans to promote the SDGs outside of scholarship by providing opportunities for UC Berkeley's undergraduate students to conduct research that addresses the key issues surrounding the underrepresented SDGs. The student organization will recruit students to address and conduct research on one SDG-related local issue each semester - rotating SDGs based on frequency and student interest.

With academic and extracurricular efforts, the UC Berkeley community can help guide the direction of university leadership in advancing the SDGs.

Research Addendum: Faculty Feedback

Purpose of Collecting Feedback

This project was designed to identify the strengths of UC Berkeley's sustainability course curriculum in terms of UN SDG relevancy; and, in doing so, research and raise awareness of the role of higher education in advancing issues of sustainable development.

Despite utilizing UC Berkeley's Sustainability, Tracking, Assessment & Rating System (STARS) and a strict mapping methodology with keywords, the team recognized that there are limitations to our methodology and data. The indeterminate nature of several course descriptions and the potential for varied perspectives from different team members poses a possible challenge in terms of consistency and accuracy of mapping.

To remedy potential inconsistencies with our SDG mapping, the team decided to contact the staff and faculty members who taught these courses to better understand the accuracy of our methodology. In reaching out, we hoped to not only receive feedback on the accuracy of our mapping, but also identify SDG-oriented extracurricular activities and research being conducted by the UC Berkeley community. Furthermore, we collaborated with the UC Berkeley Master of Development Program to utilize the emails to discuss opportunities for faculty and staff members to opt into a campus-wide multidisciplinary network of SDG-minded individuals.

Faculty Feedback Process

The Faculty Feedback Process consisted of three phases and two waves:

1. Phase 1: Gathering contact information
2. Phase 2: Sending out emails and feedback requests
3. Phase 3: Taking feedback into consideration and revising our database

Phase 1 was fairly straightforward. The STARS database we used to map the SDGs also contained the names of the lecturers and professors that were teaching those courses at the time. However, it lacked the contact information of those professors and lecturers. Thus, the team manually compiled its own database of contact information by searching through the UC Berkeley Campus Directory and the school's various departmental websites. Because our SDG mapping was based on course offerings from 2015-2018, some of the courses and instructor information was outdated. However, this was less of an issue than we originally anticipated, as only a small amount of our corresponding contact information was invalid as a result.

After compiling all of the contact information, we drafted an email to explain the SDG mapping project and how we incorporated their course descriptions and material into the database. Attached below is a copy of the email utilized in **Phase 2.**

Subject: [Action requested] Share your feedback! UN SDG x UCB Sustainability Courses

Dear {{Name}},

We hope this email finds you well. **We are a student group under the UC Berkeley Office of Sustainability & Carbon Solutions mapping the UC Berkeley sustainability-related courses to the UN Sustainable Development Goals (SDGs).** The goal of this project is to identify the strengths and opportunities of UC Berkeley's sustainability course curriculum in terms of UN SDG relevancy, as well as research and raise awareness of the role that higher education universities can play in advancing the SDGs.

Your course(s) was/were included in those mapped to the UN SDGs. We would highly appreciate your feedback on the accuracy and usefulness of this mapping. **To provide feedback, please follow the steps outlined in the following Google Form: https://tinyurl.com/SDGFeedback.** The form also provides an opportunity to subscribe to a listserve of faculty wishing to join a growing, multidisciplinary community of faculty contributing to the SDGs.

This course list mapping is an extension of UC Berkeley's Inventory of Sustainability Courses, a project that identified over 600 sustainability-related courses, completed by the UC Berkeley Office of Sustainability in January of 2019. ***This project mapped courses offered from the 2015-2018 school years, so some of the listed courses may be outdated.***

To read the full report on our project, access the PDF here: https://tinyurl.com/UCBxSDG.

Moving forward, in addition to courses, we plan to promote the SDGs by providing opportunities for UC Berkeley's undergraduate students to conduct research that addresses the key issues surrounding the identified underrepresented SDGs. In the following semesters, we aim to recruit students to address and conduct research on one SDG-related local issue each semester - rotating SDGs based on frequency and student interest.

For more information (ie: who we are / how this project was funded), visit our page on the UCB Office of Sustainability & Carbon Solutions website here.

If you have any questions/comments/concerns, feel free to leave them in the previously mentioned Google Form *or* email us at seaguls.ucb@gmail.com.

Sincerely,

Students with the UCB Office of Sustainability & Carbon Solutions

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We also included a link to a Google Form so that the recipient could easily provide feedback. Questions on our form included:

> "How accurately do you believe our mapping represents your classes?"
> "In what ways could we improve our mapping?"
> "Are you working on any research, curriculum, and/or courses that you feel identifies with the SDGs? If so, please elaborate below."

Phase 3 was conducted on a rolling basis. After we sent out the emails and feedback form, we reviewed the feedback given and replied to professors who wanted clarification. Taking the feedback responses and conversations with professors into consideration, we revised our SDG mapping master dataset.

To get as much participation as possible, we sent out **two waves of emails**: the first on April 15th, and the second on June 15th. We decided to send out a second wave of emails because we realized that we had sent the first wave out in a very hectic period (wherein UC Berkeley was only a few weeks away from its final examination week, and professors were still in the process of transitioning classes online due to the coronavirus outbreak).

We received feedback from 42 professors and lecturers, with an 8% response rate.

Information & Data Gained from Feedback

To obtain external feedback on the accuracy of our mapping, we included a question on the feedback form that asked professors and staff how accurately they thought our mapping was for their respective classes - with a 5 being the most accurate and 1 being the least accurate. **Based on the feedback data, the average rating we received was 3.40 out of 5.** This indicates a satisfactory accuracy of our mapping, with room for improvement. Below is a detailed breakdown of how many of each rating we received.

Rating	# Of Responses
1	4
2	4
3	15
4	9
5	10

We mainly received four areas of written feedback, categorized in the chart below. (Note that the total number of responses on the chart adds to more than the number of faculty responses, as some feedback questions are mapped to multiple categories).

Areas of Feedback	**# Of Responses**
Inaccurate mapping to SDGs	18
Inaccuracy with STARS data (includes not including a course, incorrect course title, description, or professor, and general outdatedness of data)	15
Positive Feedback (such as praise for our project, “great work” etc)	3
Miscellaneous	5

This project is based on the most recent UC Berkeley STARS Assessment - which analyzed course listings from 2015-2018. Thus, many course titles, descriptions, and professors were out of date. Although we received a lot of feedback pertaining to this outdated information, we did not update this information in our database to maintain the validity of the project, which intentionally focused on 2015-2018 data. We only updated our database with the revised SDG mapping based on faculty feedback.

In addition to the course mapping, we gained valuable information about additional work that faculty members are conducting in the realm of UN SDGs. Of the 42 faculty members who responded, 22 responded that they were working on research, developing curriculum, or teaching additional courses that identify with the SDGs in some capacity. This allows us to better contextualize the role of SDGs at UC Berkeley, beyond course offerings.

Final Suggestions

In addition to specific improvements to courses and our mappings, we received general feedback on how to improve our course mapping for future iterations. We have consolidated these suggestions into the list below:

- Including more than two tiers of SDG relevance (beyond just primary and secondary)
- Addressing environmental law courses through a more intersectional lens (i.e. by mapping them to SDGs beyond goal 16)
- Making the dataset interface more straightforward (i.e. finding courses, professors, and mapped SDGs)
- Providing email addresses for the listed instructors to encourage collaboration

These suggestions will be considered in future iterations of the SDG mapping project.