



SUSTAINABLE CURRICULUM REPORT CONCORDIA UNIVERSITY:

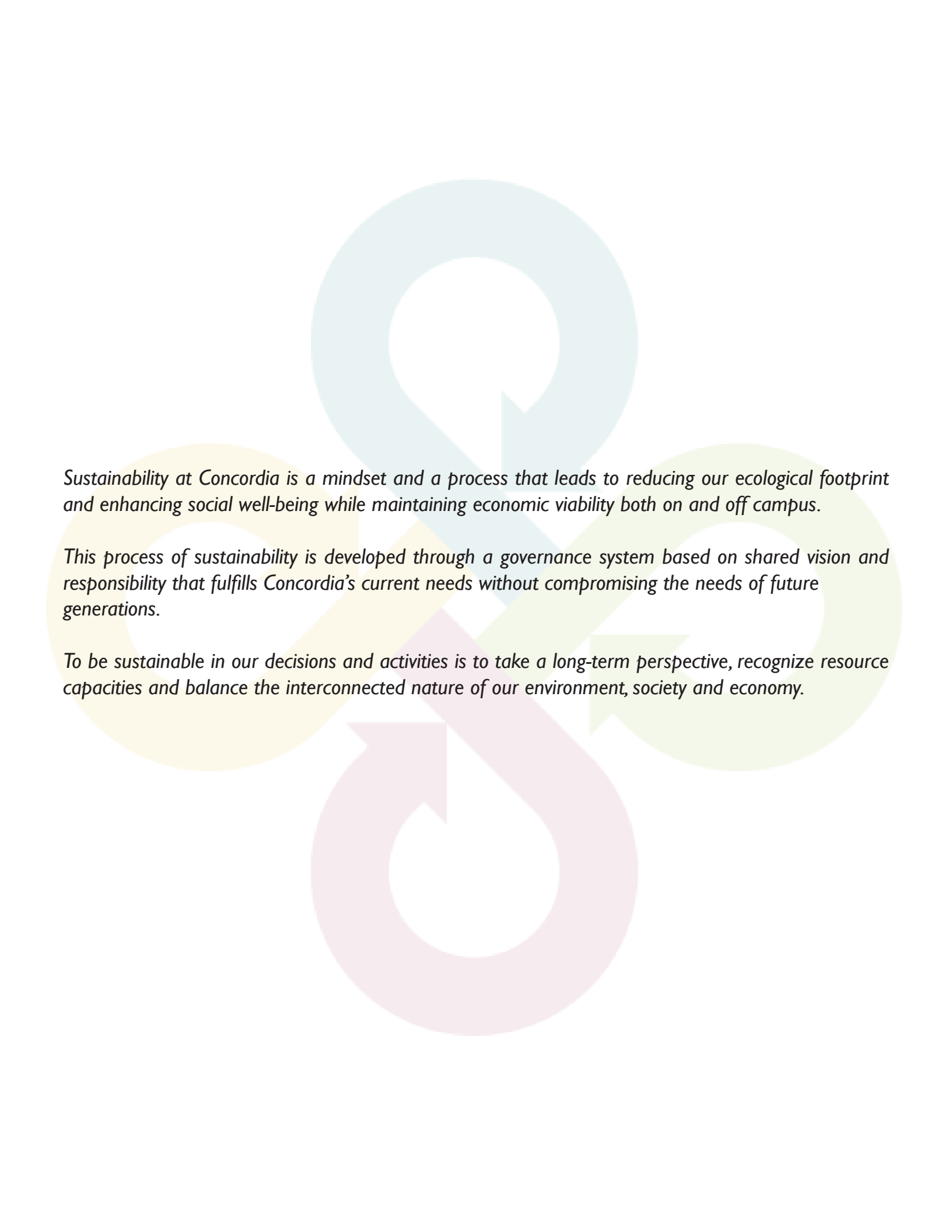
FACULTIES OF ENGINEERING, FINE ARTS AND JOHN MOLSON
SCHOOL OF BUSINESS

SUSTAINABILITY ACTION FUND & CONCORDIA ACADEMIC PLAN 2012-2016

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2014 SUSTAINABLE CURRICULUM REPORT



Sustainability at Concordia is a mindset and a process that leads to reducing our ecological footprint and enhancing social well-being while maintaining economic viability both on and off campus.

This process of sustainability is developed through a governance system based on shared vision and responsibility that fulfills Concordia's current needs without compromising the needs of future generations.

To be sustainable in our decisions and activities is to take a long-term perspective, recognize resource capacities and balance the interconnected nature of our environment, society and economy.



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Executive Summary

The Sustainability Action Fund has partnered with the Academic Plan 2012-2016 to conduct the Sustainable Curriculum Project in order to quantify the extent of sustainability content in the undergraduate curriculum at Concordia University. Following the 2013 Sustainable Curriculum Report on the Faculty of Arts and Science, we surveyed the three remaining faculties: Engineering, Fine Arts and the John Molson School of Business. In doing so, all cases of sustainable education have been recorded as a reference for the further integration of sustainability in the undergraduate education of all Concordia programs. Areas lacking sustainability content were also identified as opportunities for improvement.

Key Findings:

Engineering

- 19 of 251 courses (7.6%) feature some sustainability content.
- 2 out of 5 departments offer one or more courses that are sustainability focused.
- 8 of 19 sustainability content courses provide students with practical experience.
- Sustainability courses from this faculty primarily focus on the Environment while Social and Economic sustainability receive little coverage.

Fine Arts

- 14 of 510 courses (2.7%) feature some sustainability content.
- 3 out of 8 departments offer one or more courses that are sustainability focused.
- 7 of 14 sustainability content courses provide students with practical experience.
- Environmental, Economic and Social sustainability receive equal coverage in this Faculty.

JMSB

- 9 of 123 courses (7.3%) feature some sustainability content.
- 1 out of 5 departments offer one or more courses that are sustainability focused.
- 1 of 9 sustainability content courses provides students with practical experience.
- Sustainability courses from this faculty primarily focus on Social and Economic sustainability while Environmental issues receive little coverage.

Common Results:

- Most sustainability courses offered by a faculty are inaccessible to students from other faculties due to strict pre-requisites and small class capacities.
- Sustainability Content Courses account for less than 10% of courses in each Faculty.

Immediate Applications:

- Production of an index of sustainability content courses on the Concordia website for students wishing to enhance this aspect of their educational experience.
<http://www.concordia.ca/about/sustainability/study-teach/sustainable-courses.html>
- Acknowledgement and support for faculty members who teach and promote sustainability.
- Recognition of areas lacking coverage of sustainability.
- Generation of a list of professors and lecturers by area of expertise, based on the indexed sustainability content courses, who are willing and available to offer guest lectures.

Introduction

As of the fall of 2014, the Concordia University definition of sustainability includes “[...] to take a long-term perspective, recognize resource capacities and balance the interconnected nature of our environment, society and economy” (See full definition on page 2). While administration and student organizations have mobilized to foster a culture of sustainability within the university, the undergraduate curriculum remains the most effective way to formally educate the majority of students on social, economic and environmental responsibilities.

In 2012, Concordia conducted a Sustainability Tracking, Assessment and Ranking System (STARS) self-audit based on criteria established by the Association for the Advancement of Sustainability in Higher Education (AASHE). Ratings are evaluated on different aspects (operational, educational, research, administrative, etc.). While Concordia University had good results for topics such as co-curricular education, transportation, and diversity & affordability due to various sustainable initiatives at both the administrative and student levels, the University received less than 20% of the allotted credits for sustainability in the curriculum. This low result was essentially due to the absence of a comprehensive review of sustainability in courses.

With the goal of assessing the sustainability content in the undergraduate curriculum, the Sustainable Curriculum Project was initiated in 2012 by the Sustainability Action Fund in partnership with the Concordia Academic Plan 2012-2016. This report, in addition to the 2014 report (See Appendix A) on sustainable curriculum in the Faculty of Arts and Science, will complete the review of all undergraduate courses offered at Concordia. The reports will provide situational awareness and allow faculty, staff and students to construct a suitable course of action to further implement sustainability in education.

Several other academic institutions, (e.g. University of Victoria) have already catalogued their courses that contain sustainability content. Having now done so, Concordia undergraduate students seeking to incorporate sustainability into their education may now easily survey all possible opportunities. By comparing courses offerings with other universities, Concordia will be able to further evaluate its offerings in sustainability courses and identify plausible directions of improvement.

Report Applications:

- Situational awareness of sustainability education offerings.
- Identification of areas for improvement.
- Report back to Professors, Departments and Departmental Chairs regarding the delivery of sustainability content to undergraduate students.
- Provide Students with the information to select sustainability content courses based on:
 - Department or Academic Unit;
 - Academic sector;
 - Sphere of sustainability (Environmental, Economic, Social, Practical);
- Reference for the next STARS university sustainability assessment.

Methodology

1. Collection of Course Descriptions

During the summer of 2014, the Coordinators of each department in the faculties of Engineering, Fine Arts and the John Molson School of Business were asked to provide course outlines for all courses offered during the 2013-2014 academic year.

Not all academic units have a central repository of course outlines. As a result, some of the participating academic units were unable to provide information on all of their courses. However, courses suspected to have sustainability content, by scanning the course calendar, were sought from individual professors if necessary to ensure their inclusion in the study.

2. Identification of Sustainability content

Course outlines were converted to text (.txt) files and analyzed with Yoshikoder, a multilingual, freeware content analysis program developed by the Weatherhead Center for International Affairs at Harvard University. In keeping with the general methodology used by other academic institutions in assessing the sustainability content of their courses, the text files were searched for predetermined keywords which represent different topical spheres of sustainability. Whereas some Universities used small sets of keywords, the set used in this evaluation was expanded to 121 words (See Table 1).

Course outlines containing at least one of these keywords or suspected of having sustainability content were then individually examined by researchers to assign the appropriate score and sustainability sphere(s). Dividing keywords by sphere of sustainability provides a measure of the representation of sustainability topics in the curriculum which has not been included in surveys completed by other universities.

Topical Sphere of Sustainability	Table 1: Keywords
Environmental (36)	<p>air pollution; antipollution; bio-centric; biodiversity; bio-regions; bio-safety; carbon offset; clean energy; climate change; conservation; deep ecology; eco-centric; ecological; ecological ethics; ecological footprint; ecological principle; ecology; ecosystem service evaluation; environmental; environmental ethics; environmental protection; environmental values; farming; fisheries; forestry; global warming; life cycle; organic agriculture; pollution; pollution control; protected areas; renewable; solar power; sustainability; sustainable; water.</p>
Social (38)	<p>Aboriginal traditional knowledge; anti-colonial; anti-oppression; commons; democratic; disaster relief; eco-politics; ecological ethics; environmental justice; environmental policies; environmental policy; ethics; food safety; food security; food sovereignty; global governance; holistic; holistic health; holistic health education; human population; human reproduction; humane education; indigenous rights; interconnected; interdependent; interdisciplinary; minority rights; native rights; NGO; NGOs; peace; population growth; public health; resource management; social action; stakeholder; urban agriculture; women's rights.</p>
Economic (28)	<p>alternative economics; carbon market; cooperatives; corporate social responsibility; de-growth; ecological economics; ecological principle; economic quality; ecosphere; ecosystem services; environmental impact management; environmental management; environmental protection; environmental regulations; environmental standards; green accounting; green marketing; local economy; locanomics; poverty; poverty alleviation; property protection; social accounting; socio-economic; sociological principle; sustainable development; time banks; triple bottom line.</p>
Practical (19)	<p>activism; anti-oppression; community engagement; community organizing; consulting; cooperation; experiential learning; facilitation; group facilitation; hands-on; internship; outreach; participatory; problem based learning; public participation; service learning; sustainable action; sustainable application; sustainable practice.</p>

3. Quantification of sustainability content

The amount of sustainability content in individual courses was scored in two ways:

Courses were assigned a sustainability content score on an ordinal scale by a single researcher as follows:

- 0:** No sustainability content.
- 25:** Some sustainability content OR minor coverage of only one sphere.
- 50:** Sustainability content covering more than one sphere OR extensive coverage one particular sphere.
- 75:** Sustainability content covering three spheres OR extensive coverage of two spheres.
- 100:** Sustainability content covering all four spheres OR extensive coverage of three spheres OR focus on practical applications in addition to extensive coverage of at least one other sphere.

This criterion provides flexibility in scoring, whereby a course covering one or two spheres in great detail can receive a higher score than a course which briefly surveys more spheres.

Courses were designated as “sustainability-related” or “sustainability-focused” in keeping with AASHE and STARS terminology as follows:

Sustainability-related: content covers only one sphere and/or the course scored 25 or 50.

Sustainability-focused: content covers two or more spheres in detail and/or the course scored 75 or 100.

Sustainability Content Course: contains material on a sustainability that received a score of 25 or greater.

Results

Engineering and Computer Science

A total of 251 course outlines were collected from the five departments in the Faculty of Engineering and Computer Science and were analyzed for sustainability content. Of these, 19 courses (7.5%) were found to contain sustainability content. Four out of five departments offered at least one class the contained material on sustainability. The Department of Building, Civil and Environmental Engineering exceeded all other departments by offering nine sustainability related courses largely due to the Environmental Engineering specialization option of Civil Engineering.

Overall, the environmental sphere of sustainability had the strongest presence in engineering as it was featured in 15 courses. Five courses included topics in social sustainability and two courses in economics; 47% of courses contained practical components such as labs, case studies and projects. Furthermore, the Faculty of Engineering and Computer Science hosts a 1.5 credit course on sustainability that is mandatory for all engineering students.

Table 2: List of Sustainability Content Courses offered by the Faculty of Engineering and Computer Science in the 2013-2014 school year.

Course Code	Course Name
ELEC 437	Renewable Energy Systems
ENCS 393	Social and Ethical Dimensions of Information and Communication Technologies
ENGR 201	Professional Practice and Responsibility
ENGR 202	Sustainable Development and Environmental Stewardship
ENGR 392	Impact of Technology on Society
MECH 454	Vehicular Internal Combustion Engines
INDU 440	Product Design and Development
INDU 330	Engineering Management
BLDG 472	Building Energy Conservation Technologies
BLDG 482	Impact of Technology on Society and Architecture
CIVI 361	Introduction to Environmental Engineering
CIVI 382	Water Resources Engineering
CIVI 390	Civil Engineering Design Project
CIVI 464	Environmental Impact Assessment
CIVI 466	Engineering Aspects of Chemical and Biological Processes
CIVI 467	Air Pollution and Emission Control
CIVI 483	Hydrology
CIVI 465	Water Pollution and Control
CIVI 469	Geo-Environmental Engineering

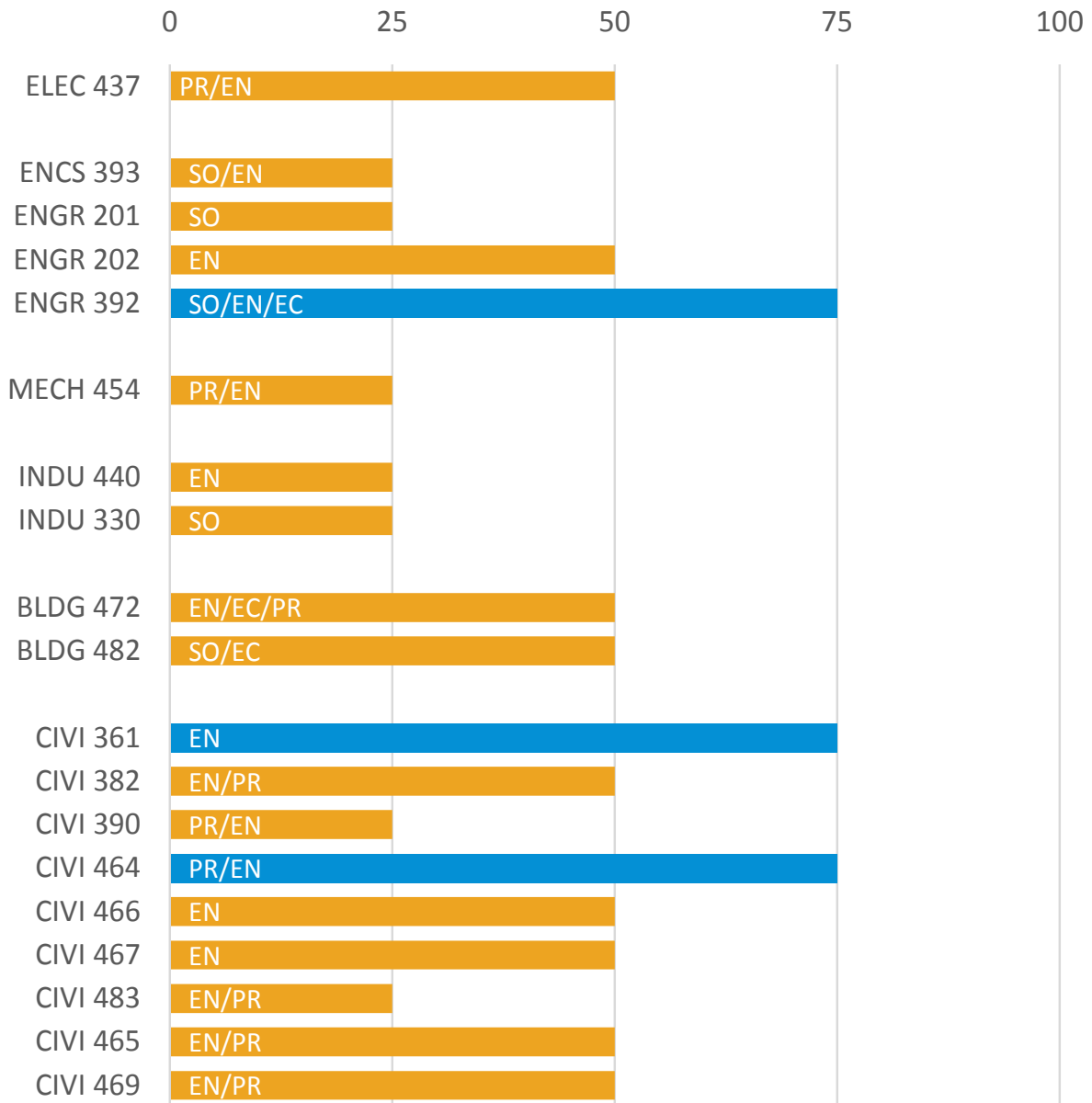


Figure I: ENCS Sustainability Content Course Rankings.

Yellow bars indicate sustainability-related courses (content score ≤ 50), blue bars indicate sustainability-focused courses (content score > 50).

So = Social; En = Environmental; Ec = Economic; Pr = Practical spheres of sustainability.

Table 3: Number of Sustainability Content Courses by score, per program In the ENCS Faculty.

Program	Scores					TOTAL
	100	75	50	25	0	
General Engineering (ENGR)		1	1	1	14	17
Engineering and Computer Science (ENCS)				1	4	5
Computer Eng (COEN)					20	20
Electrical Eng (ELEC)			1		37	38
Mechanical (MECH)				1	46	47
Industrial (INDU)				2	17	19
Building (BLDG)			2		16	18
Civil (CIVI)		2	5	2	15	24
Building, Civil and Environmental Engineering (BCEE)					12	12
Software (SOEN)					18	18
Computer Sciences (COMP)					33	33
TOTAL	0	3	9	7	232	251

Scoring criteria: 100- sustainability-focused, covering ≥ 3 topical spheres or emphasis on Practical applications in addition to coverage of one other sphere; 75- sustainability-focused, covering ≥ 2 topical spheres; 50- sustainability-related, covering ≥ 1 sphere extensively; 25- sustainability-related, covering 1 Sphere; 0- no sustainability content.

Fine Arts

A total of 510 course outlines were collected from eight departments of the Faculty of Fine Arts and were analyzed for sustainability content. Of these, 14 courses (2.7 %) were found to contain sustainability content. This outcome is due to the Faculty's focus on studio-based courses that feature developing technical artistic skills. The courses identified were offered by the Departments of Art Education, Theatre and Design Arts, the latter hosting nine of the 14 classes, seven of which were found to be sustainability focused.

Sustainability Content courses in the Departments of Art Education and Theatre covered the social sphere of sustainability whereas Design Arts covered all three spheres indicating that their courses provide students with a well-rounded and in-depth understanding of sustainability. In addition, 50% of identified courses contained practical components, the highest proportion of all Faculties.

Table 4: List of Sustainability Content Courses offered by the Faculty Fine Arts in the 2013-2014 school year.

Course Code	Course Name
ARTE 320	Multidisciplinary Approaches to Art and Teaching
ARTE 352	Light-Based Media
ARTE 434	Professional Practice for Art Educators
DART 261	Introduction to Design Studies
DART 262	Design History and Theory II
DART 298A	Special Topics in Design Art: Design History and Theory 3
DART 391	Collaborative Design Research I
DART 392	Collaborative Design Research II
DART 447	3D Design Technologies
DART 448	Ecology and 3D Design
DART 491	Discursive Design Research I
DART 492	Discursive Design Research II
FFAR 298C	Encultured Eating: Introduction to Food Studies
TDEV 209	The Artist in Community

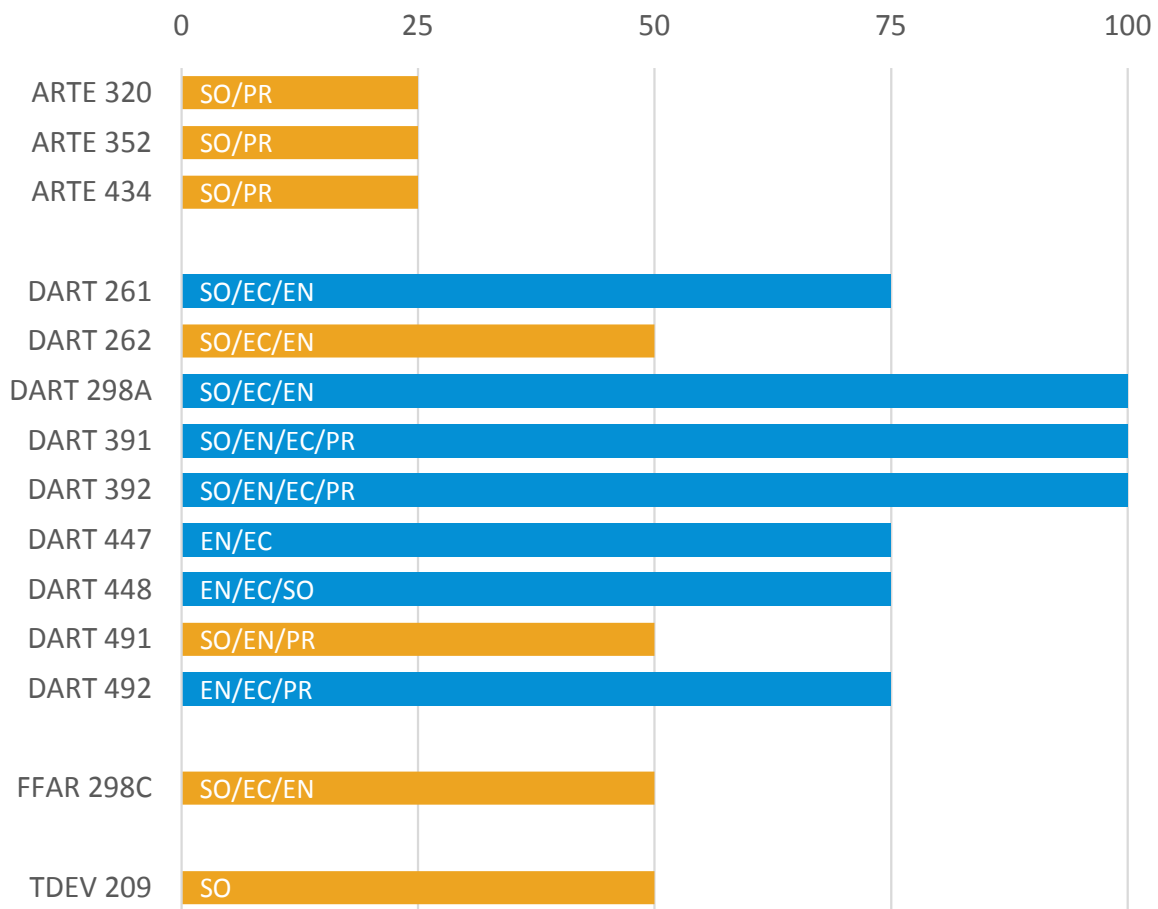


Figure 2: Fine Arts Sustainability Content Course Rankings.

Yellow bars indicate sustainability-related courses (content score ≤ 50), blue bars indicate sustainability-focused courses (content score > 50).

So = Social; En = Environmental; Ec = Economic; Pr = Practical spheres of sustainability.

Table 5: Number of Sustainability Content Courses by score per program in the Fine Arts Faculty.

Program	Scores					TOTAL
	100	75	50	25	0	
Design Art (DART)	3	4	2		16	25
Theatre Development (TDEV)			1		12	13
Art Education (ARTE)				3	16	19
Remaining Programs			1		452	453
TOTAL	3	4	4	3	496	510

Scoring criteria: 100- sustainability-focused, covering ≥ 3 topical spheres or emphasis on Practical applications in addition to coverage of one other sphere; 75- sustainability-focused, covering ≥ 2 topical spheres; 50- sustainability-related, covering ≥ 1 sphere extensively; 25- sustainability-related, covering 1 Sphere; 0- no sustainability content.

John Molson School of Business

A total of 123 courses were collected from the five departments of JMSB and were analyzed for sustainability content. Of these, nine courses (7.3%) were found to contain sustainability content. The Departments of Accountancy, Management and Marketing all offered courses that were sustainability related. The Department of Management exceeded others by offering the two courses found to be sustainability focused.

Table 6: List of Sustainability Content Courses offered by the John Molson School of Business in the 2013-2014 school year.

Course Code	Course Name
COMM 315	Business Law and Ethics
COMM 401	Strategy and Competition
MANA 299	Sustainable Management
MANA 369	Business and Sustainability
ACCO 410/470N	Government/Not-for-profit Accounting
MARK 451	Marketing of Services
MARK 485	Business to Business Marketing
MARK 491F	Food Marketing
MARK IBUS 492	Cross Cultural Communication and Management

The Economic and Social spheres of sustainability have the strongest presence within JMSB with eight courses containing subject matter relevant to economic sustainability and 7 courses containing topics in social sustainability. Environmental and Practical spheres, however, are less present with two courses containing environmental sustainability and one course with practical aspects.

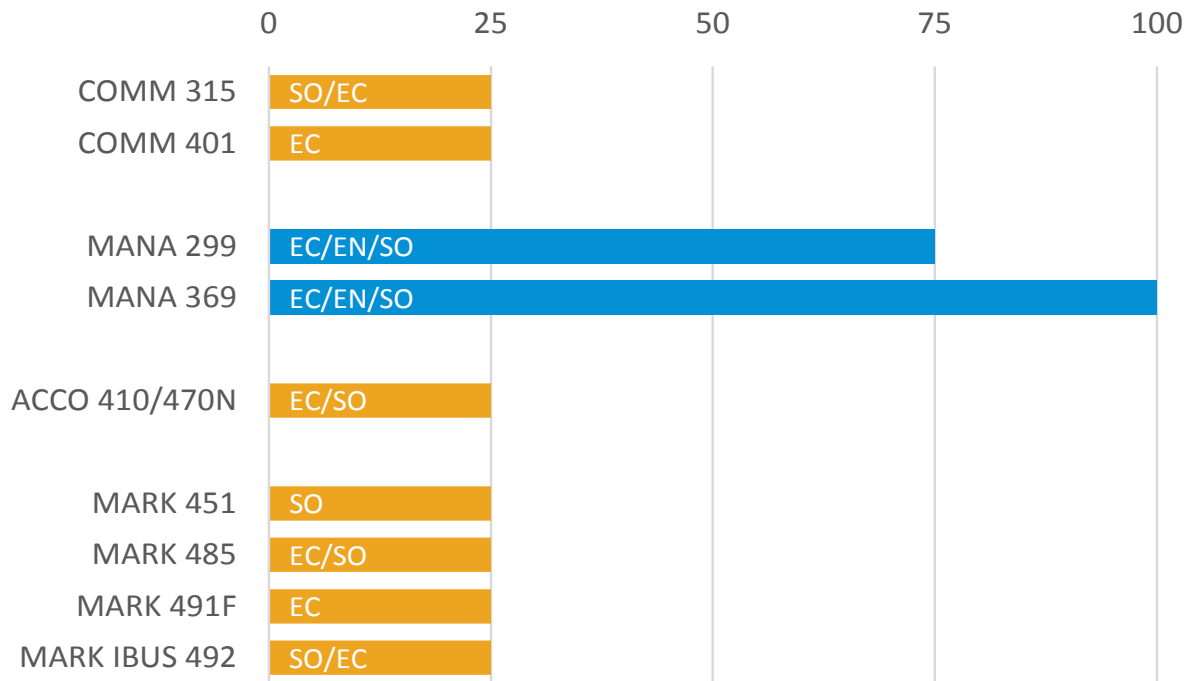


Figure 3: JMSB Sustainability Content Course Rankings.

Yellow bars indicate sustainability-related courses (content score ≤ 50), blue bars indicate sustainability-focused courses (content score > 50).

So = Social; En = Environmental; Ec = Economic; Pr = Practical spheres of sustainability.

Table 7: Number of Sustainability Content Courses by score per program in JMSB.

Program	Scores					TOTAL
	100	75	50	25	0	
Administration (ADM)					2	2
Business Tech Management (BTM)					9	9
Communication (COMM)				2	15	17
Finance (FINA)					26	26
Management (MANA)	1	1			23	25
Marketing (MARK)				4	15	19
Supply Chain Operations Management (SCOM)					7	7
Accounting				1	17	18
TOTAL	1	1	0	7	114	123

Scoring criteria: 100- sustainability-focused, covering ≥ 3 topical spheres or emphasis on Practical applications in addition to coverage of one other sphere; 75- sustainability-focused, covering ≥ 2 topical spheres; 50- sustainability-related, covering ≥ 1 sphere extensively; 25- sustainability-related, covering 1 Sphere; 0- no sustainability content.

Accessibility

Of the 42 sustainability content courses identified in this report, as well as the 109 courses identified in the Faculty Arts in Science in the previous curriculum report (See Appendix A), only 19% were at the 200 (introductory) level.

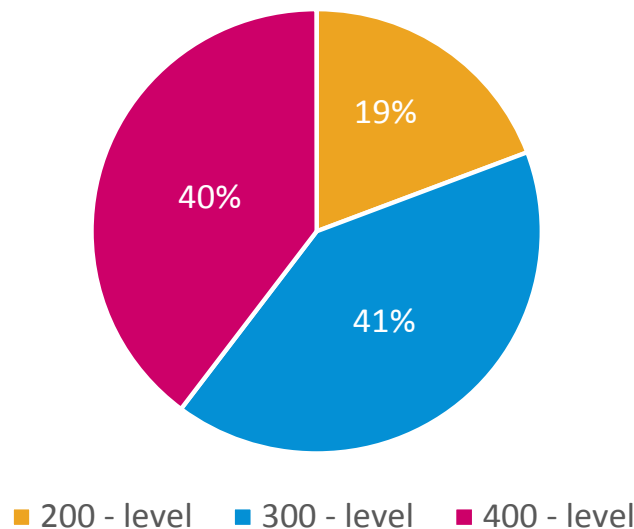


Figure 4: Percentage of Sustainability Content Courses per Level.

The low number of 200-level sustainability courses indicates that students who wish to enrich their education with such courses have limited options as most sustainability courses in the 300 and 400 levels require many prerequisites or enrollment in a specific program. Also, 40% of the sustainability content courses are at the 400-level; most often these courses offer only one section per year and are part of a specialization. 400-level courses also generally comprise of small classes and are sometimes cross listed with graduate courses.

Overall, accessibility proves to be a major obstacle in providing students with adequate opportunities to learn about sustainability.

Sustainability Attributes

The syllabi of Sustainability Content Courses were analyzed in detail to determine which spheres of sustainability were addressed; Environmental, Social, Economic and Practical. The following figure displays the number of courses that cover each sphere as a percentage and does not reflect the quality of the material.

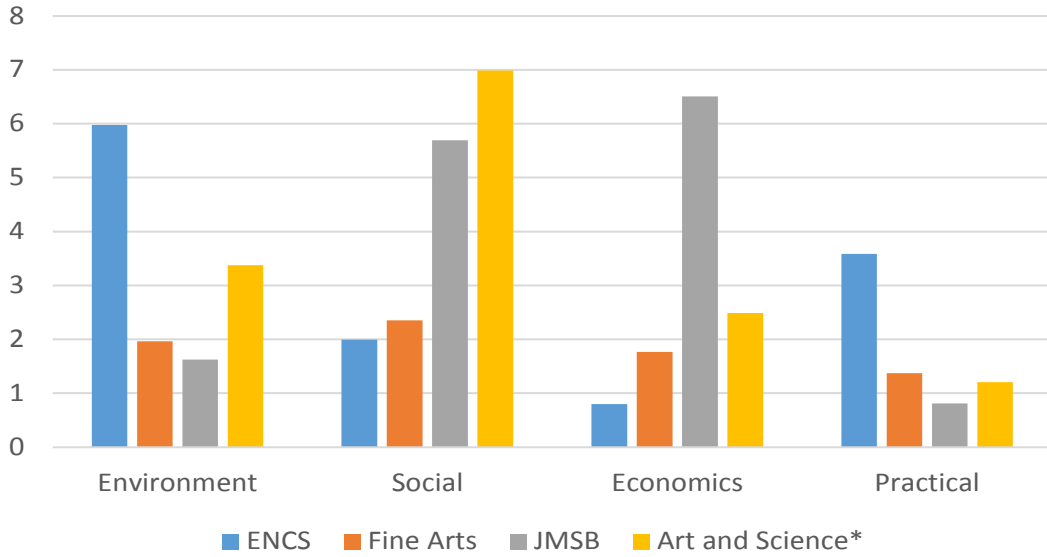


Figure 5: Percentage of Courses from each Faculty which cover Spheres of Sustainability

Furthermore, by looking at the number of spheres covered in Sustainability Content Courses, it can be determined if a Faculty has the tendency to integrate one sphere into their courses or if they develop courses that specialize in sustainability and cover multiple topics.

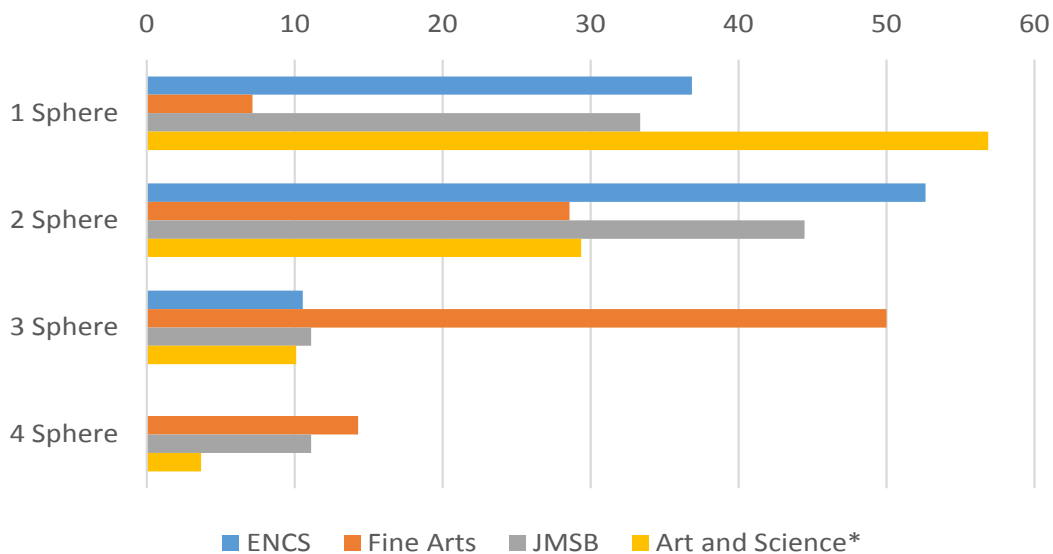


Figure 6: Percentage of Sustainability Content Courses per Faculty covering one, two, three or four spheres of sustainability. *Arts and Science data from 2014 Sustainable Curriculum Report.

Conclusion

Through the process of identifying Sustainability Content Courses two issues became apparent; the quantity and accessibility of these courses.

In each Faculty, fewer than 10% of all courses contained material on sustainability. As such, students are provided with few opportunities to acquire knowledge about adapting to a changing world.

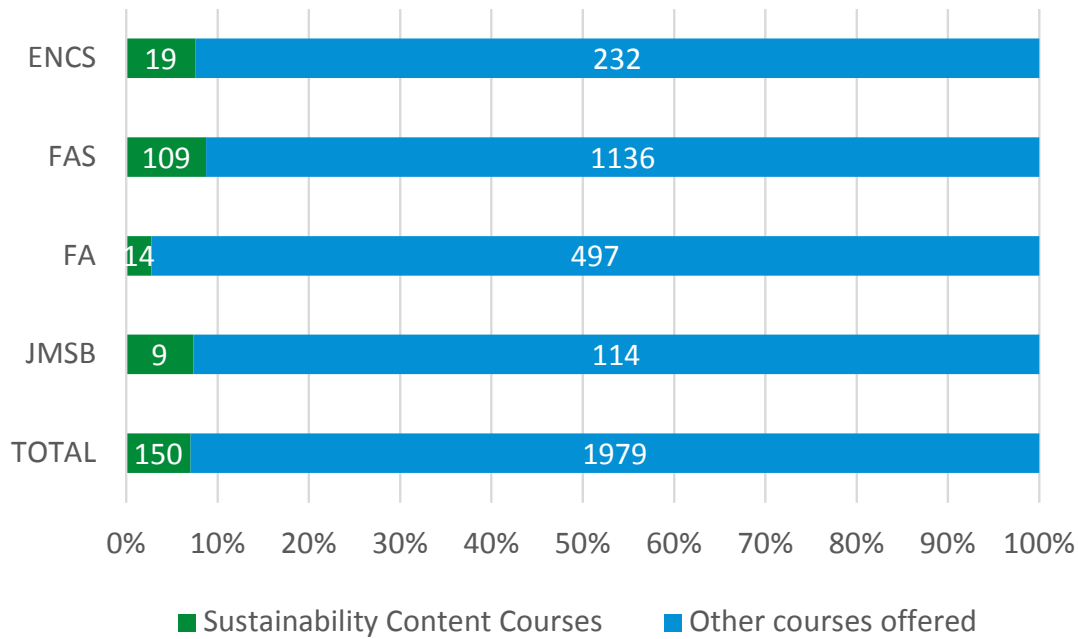


Figure 7: Distribution of Sustainability Content Courses by Faculty

ENCS – Engineering and Computer Science, FAS – Faculty of Arts and Science, FA – Fine Arts, JMSB – John Molson School of Business.

27 out of the 45 departments (60%) from all faculties offer at least one course with some sustainability content. This demonstrates that the majority of departments at Concordia are attempting to integrate sustainability into their programs.

Sustainability Content Courses had a tendency to cover sustainability topics most similar to the core subject of the course rather than provide students with a holistic view of the issues. In adjusting course material to teach holistic and critical thinking, students will become more prepared to handle the complex nature of sustainability issues.

Two options are available to increase the amount of sustainability being taught through the university; departments can either continue to develop new courses related to sustainability in their field, or existing sustainability courses can be cross listed and modified to admit students from other departments allowing for further interdisciplinarity and increased accessibility in these courses. Ideally a combination of both options would be optimal in providing students with further knowledge on sustainability.

Appendix I: Arts and Science Data (2013-2014 Report)

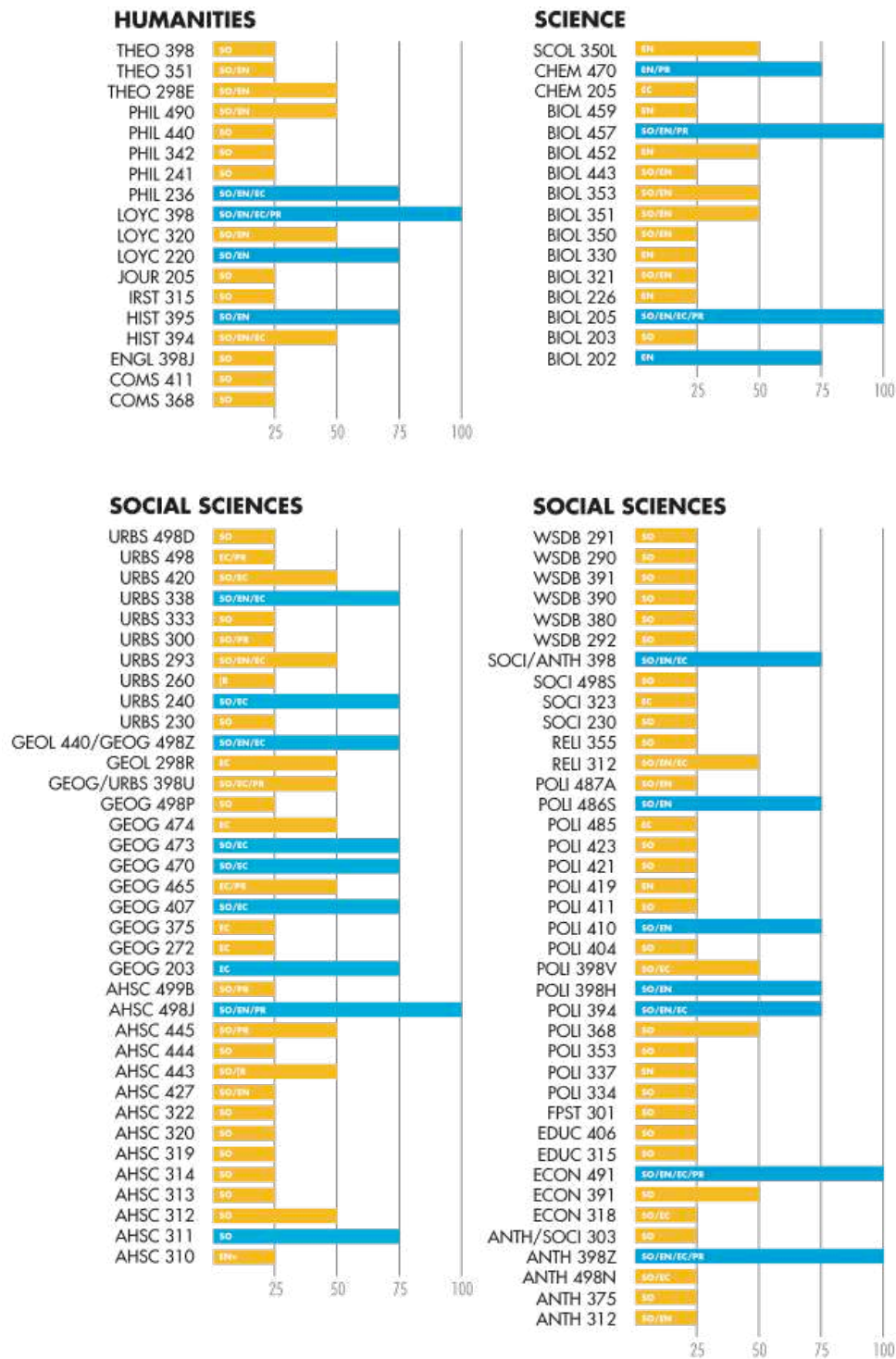


Figure 8: Arts and Science Sustainability Content Course Rankings.

Yellow bars indicate sustainability-related courses (content score ≤ 50), blue bars indicate sustainability-focused courses (content score > 50).

So = Social; En = Environmental; Ec = Economic; Pr = Practical spheres of sustainability.

Errata - Courses with sustainability content not included in report: *GEOG 204, GEOG 210, GEOG 274, GEOG 290, GEOG 300, GEOG 330, GEOG 333, GEOG 355, GEOG 371, GEOG 378, GEOG 407, GEOG 458, GEOG 475, GEOG 478, URBS 481, URBS 450.*

Corrections of assigned sustainability spheres: *GEOG 203 (En, So), GEOG 272 (En), GEOG 375 (En), GEOG 470 (En, So).*



For more information on the Sustainable Curriculum Project,
please contact the Sustainability Action Fund at safconcordia@gmail.com
or visit our webpage at:

<http://www.safconcordia.ca/projects/sustainable-curriculum-project/>