



Course Revision Form

(2013)

1. Will this course revision affect a current program?
If "yes", the Program Revision is indicated....

Yes No
 on Program Revision Form submitted concurrently OR
 in the Rationale section below ★

2. Teaching Department:

Animal Science

4. Campus
(Downtown, Macdonald, Off Campus, Distance Ed, Other - specify)

Macdonald Campus

5. Effective Term of Implementation
(Ex. Sept. 2004 = 200409)

Term: 201909

Retirement ★

3. Administering Faculty/Unit:

FAES

6. Responsible Instructor:

Roger Cue

8. Course Number(s)
Indicate course number & the number of terms spanned:
(tick all that apply)

Subject/course number: ANSC 301

Course(s) Span:

1 term
 2 consecutive terms (D1, D2)
 2 non-consecutive terms (N1, N2)
 3 consecutive terms (J1, J2, J3)

7. Credit Weight
(or CEU's for non-credit CE courses): ★

3

Old Credit Weight or CEU's (if applicable)

9. Number Change From: ★

10. Consolidation of Courses:

11. Split of Multi-Term Course:

12. Course Title (Limit 30 char.) - required for all courses.

Principles of Animal Breeding

Old Course Title (if applicable)

13. Course Title to Appear in the eCalendar (Optional)
(Limit 59 characters):
Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title in Box 12.

14. Rationale for revised course (and affected programs where streamline procedures allow; see ★ in guidelines)

Implementing additional pre-requisite; formalising the requirement for a basic genetics course (LSCI 204) as a prerequisite. LSCI 204 is already a required course in the major/specialisation (Agro-environmental Sciences major and Animal Production specialisation) for which this course is required. Students taking this course in the order recommended will already have taken LSCI 204, thus this change will not occasion any substantive impact on the degree program. It will not increase any credit load; it will only serve to better orientate students' pedagogic course progression.

15. New Course Description (as it will appear in the eCalendar [maximum 100 words]):
(N.B. Faculty of Medicine must append complete course outline)

16. Old Course Description
(may be found in the Calendar or Banner)

17. Supplementary information to appear in the Calendar in addition to the course description.
Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc.
Please enter the information as it should appear in the calendar notes.

18. Schedule Types(s):
(Enter all that apply – see course guidelines for a complete list.)

lectures	Hours per Week	lab	Hours per Week	Hours per Week
_____	<input style="width: 40px;" type="text" value="3"/>	_____	<input style="width: 40px;" type="text" value="2"/>	<input style="width: 40px;" type="text"/>
_____	<input style="width: 40px;" type="text"/>	_____	<input style="width: 40px;" type="text"/>	<input style="width: 40px;" type="text"/>
Total Hours per Week:				<input style="width: 40px;" type="text" value="5"/>
Total Number of Weeks:				<input style="width: 40px;" type="text" value="13"/>

19. Projected Enrolment:

20. Revised Prerequisite(s) (Courses or Tests) (in full)
Specify course number(s) or name(s) of test(s):

AEMA 310, LSCI 204

If the student does not have a prerequisite
should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student
must attain in prerequisite course(s) or test(s):

B. Can the prerequisite course(s) or test(s) be taken in the
same term as this course?
 Yes No

Old prerequisite course number(s) (if none, list "None")
or test score title(s) (if applicable)

AEMA 310

21. Revised Corequisite(s) Course Number(s) (in full):
Specify course number(s):

If the student does not register for the corequisite
in the same term should web registration be blocked?
 Yes No

Old corequisite(s) course numbers (if none, list "None"):

22. Revised Restriction(s):

Old Restriction(s) (if none, list "None")

23. Additional Course Charges (must be approved by the Fee Policy
Committee)

Description of Fee (e.g. screening fee)	Amount

24. Requires Teaching, Physical, or Financial Resources
Not Currently Available (attach explanation)

Yes No

25. Consultation Reports Attached

Yes N/A

INFORMATION FOR ENROLMENT SERVICES

To be completed by Faculty
 Slot Course: Yes No

To be completed by ES
 CIP Code

For Continuing Studies Use

CS Admin. Unit :

CS Non-Grant Courses:


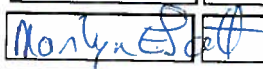
Flat Rate: CdnFlat Rate:

 Yes N/A

Thesis Component: Yes No

 Yes N/A

26. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name		Raj Duggavathi		M. E. Scott		
Signature						
Date		January 04, 2019		2019-01-28		

Departmental Contact Person (name/phone/email)

Subject: Re: proposed change to prerequisites for ANSC 301 Principles of Animal Breeding

From: "Valerie Gravel, Dr." <valerie.gravel@mcgill.ca>

Date: 03/01/2019, 8:46 a.m.

To: "Raj Duggavathi, Dr." <raj.duggavathi@mcgill.ca>

CC: "Sergio Burgos, Dr." <sergio.burgos@mcgill.ca>, "Roger I. Cue, Dr." <roger.cue@mcgill.ca>

Hi Roger, Raj and Sergio,
Happy New Year!

I think that makes perfect sense so I agree.

Take care,
Valérie

On Jan 3, 2019, at 5:13 AM, Raj Duggavathi, Dr. <raj.duggavathi@mcgill.ca> wrote:

Roger et al, Happy new year!

I find this change quite reasonable. Will wait for Valerie's comments before signing it.

cheers

rd

On Jan 2, 2019, at 6:17 PM, Sergio Burgos, Dr. <sergio.burgos@mcgill.ca> wrote:

Roger,

Happy New Year to all!

Upon careful review, I found your proposal to be sensible and cannot foresee it causing any problems for student within the specialization. Therefore, I agree with the proposed change.

I remain available for further consultation.

Best regards,

Sergio Burgos

Specialisation Coordinator, Animal Production

Department of Animal Science

Faculty of Agricultural and Environmental Sciences

McGill University, Macdonald Campus

21,111 Lakeshore Drive

Sainte-Anne-de-Bellevue, QC, H9X 3V9

Tel: (514) 398-7802

e-mail: sergio.burgos@mcgill.ca

-----Original Message-----

From: Roger I. Cue, Dr.

Sent: Wednesday, January 2, 2019 2:11 PM

To: Sergio Burgos, Dr. <sergio.burgos@mcgill.ca>; Raj Duggavathi, Dr.

<raj.duggavathi@mcgill.ca>; Valerie Gravel, Dr. <valerie.gravel@mcgill.ca>

Subject: proposed change to prerequisites for ANSC 301 Principles of Animal Breeding

From Roger Cue

Instructor, ANSC 301, Principles of Animal Breeding

To Prof. S. Burgos, Specialisation Coordinator, Animal Production To. Prof. R. Duggavathi, Chair, Animal Science To Prof. Valérie Gravel, Specialisation Coordinator, Professional Agrolgy

Raj, Sergio, Valérie,

I have taken over the teaching of ANSC 301, with the retirement of Professor Monardes. ANSC 301 is a course only required in the Animal Production Specialisation (and a listed complementary course in the Professional Agrolgy Specialisation).

I wish to add the basic genetics course (LSCI 204) as a pre-requisite (to add to the current requirement of AEMA 310).

I believe that pedagogically it is sensible that students have a basic understanding of genetics on which to build this course. For students who take courses in our suggested schedule this will occasion no changes or difficulties.

It will prevent students taking this course in their first year without adequate background (IMO), or students from majors not requiring Genetics.

I attach the Course revision form (Word document, .doc format) for your perusal and edification.

If you agree with this proposed change would you please reply signaling your agreement, so that I can put this forward (with the Department Chair's signature) to FAPC. If you have disagreements please let me know what and why.

Wishing you all a Happy New Year,

Roger Cue

Instructor ANSC 301

Program Director Agro-environmental Sciences Major

Valérie Gravel, agr., Ph.D.

Assistant Professor

Department of Plant Science (R2020c)

McGill University - Macdonald Campus

21111 Lakeshore Road

Sainte-Anne-de-Bellevue, QC H9X3V9

Canada

Tel.: 514-398-8132

Email: valerie.gravel@mcgill.ca

Revision for AEBI 210

Proposal Reference Number : 14630
PRN Alias : 18-19#933
Version No : 2
Submitted By : Prof Olivia Wilkins
Edited By : Ms Joanne Ten Eyck

[Display Printable PDF](#)

Summary of Changes

	Current Data	New Data								
Program Affected?		N								
Program Change Form Submitted?										
Subject/Course/Term	AEBI 210 <ul style="list-style-type: none"> • one term 									
Credit Weight or CEU's	3 credits.									
Course Activities	<ul style="list-style-type: none"> • A - Lecture • L - Laboratory • Q - Conference 	<table border="1"> <thead> <tr> <th>Schedule Type</th> <th>Hours Per Week</th> </tr> </thead> <tbody> <tr> <td>A - Lecture</td> <td>3</td> </tr> <tr> <td>L - Laboratory</td> <td>3</td> </tr> <tr> <td>Q - Conference</td> <td>0</td> </tr> </tbody> </table> <p>Total Hours per Week : 6 Total Number of Weeks : 13</p>	Schedule Type	Hours Per Week	A - Lecture	3	L - Laboratory	3	Q - Conference	0
Schedule Type	Hours Per Week									
A - Lecture	3									
L - Laboratory	3									
Q - Conference	0									
Course Title	<table border="1"> <tr> <td>Course Title on Transcript</td> <td>Organisms 1</td> </tr> <tr> <td>Course Title on Calendar</td> <td>Organisms 1.</td> </tr> </table>	Course Title on Transcript	Organisms 1	Course Title on Calendar	Organisms 1.					
Course Title on Transcript	Organisms 1									
Course Title on Calendar	Organisms 1.									
Rationale		Presently the course is only scheduled to meet for 2 50 minute lectures per week, and 5 three hour labs per semester. I would like to request that course be scheduled for two 90 minute lectures per week to bring it in line with other 3 credit courses in the Faculty. In addition, the restrictions have been removed; neither course has been offered for at least 10 years.								
Responsible Instructor		Olivia Wilkins								
Course Description	The biology of plants and plant-based systems in managed and natural terrestrial environments. The interactions between autotrophs and soil organisms and selected groups of animals with close ecological and evolutionary connections with plants (e.g., herbivores and pollinators) will be explored in lecture and laboratory.									
Teaching Dept.	0076 : Plant Science									
Administering Faculty/Unit	AG : Faculty of Agric Environ Sci									
Prerequisites										

Corequisites		
Restrictions	• Restriction(s): Not open to students who have taken PLNT 201 or PLNT 211	
Supplementary Calendar Info	1. 2 hour lecture and 3 hour lab	
Additional Course Charges		
Campus		
Projected Enrollment		
Requires Resources Not Currently Available		
Explanation for Required Resources		
Consultation Reports Attached?		
Effective Term of Implementation		201909
File Attachments		No attachments have been saved yet.
To be completed by the Faculty		
For Continuing Studies Use		

Approvals Summary

[Show all comments](#)

Version No.	Departmental Curriculum Committee	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP	Version Status
2								Approved by Departmental Chair Edited by: Joanne Ten Eyck on: Jan 29 2019
1			Approved Martina Stromvik Meeting Date: Jan 16 2019 Approval Date: Jan 21 2019 View Comments		Approved 2019-01-28			Approved by Departmental Chair Created on: Nov 22 2018



1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Teaching Department: Natural Resource Sciences	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify) Macdonald	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term: 201909
3. Administering Faculty/Unit: Graduate and Postdoctoral Studies		
6. Responsible Instructor Peter G Brown		
7. Course Title (Limit 30 Characters) - required for all courses: Into the Ecozoic	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: NRSC 620 Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)	
9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters): Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above. Into the Ecozoic		
10. Credit Weight (or CEU's for non-credit CE courses): 3		
11. Rationale for new course This course will be one of four courses to be taken by students accepted into the "Leadership for the Ecozoic" project. The first two courses introduce students to theoretical frameworks; the last two courses allow students to apply their knowledge. This course is the second course that follows and builds upon the course taken in the fall, ENVR630 (Civilization and the Environment; aka "Big Bang to the Anthropocene"). Elements of this new course are derived from two special topics courses that have been offered by the Department of NRS in previous winter semesters (2015-2018). This course and its topics are not offered elsewhere in the Department or the university and is an essential component of the Leadership for the Ecozoic project.		
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline) An examination of how the "Ecozoic" framing can be used as an alternative to the current discourse on sustainability; emphasis on the evolution of major thought systems of Western culture such as private property, the nation state, money and human rights and their role in generating the rapidly accelerating decline in life's prospects. Identification and exploration of efforts currently under way to re-establish a flourishing earth; areas considered include agroecology, all species food security, family planning, forest management and others.		
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes. Designed for students in the "Leadership for the Ecozoic" project		

14. Schedule Types(s):
 (Enter all that apply – see course guidelines for a complete list.)
 (i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
Lecture (A)	1.5		
Discussion/seminar (M)	1.5		
Total Hours per Week:			3
Total Number of Weeks:			13

15. Projected Enrolment:

15

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)
 Specify course number(s) or name(s) of test(s):

ENVR 630

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
 Specify course number(s) and title(s):

None

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

Permission from instructor

20. Consultation Reports Attached
 Yes N/A

21. Additional Course Charges (must be approved by the Fee Policy Committee)



Description of Fee (e.g. screening fee)	Amount
None	

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

INFORMATION FOR ENROLMENT SERVICES

<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit : <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>
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23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	Brian Driscoll	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	M.E. Scott	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Signature	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Date	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	13 December 2018	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	2019-01-07	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Departmental Contact Person (name/phone/email)	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>					

Into the Ecozoic
Course in the Department of Natural Resource Sciences
NRSC 620 Winter Session

Prerequisite: ENVR 630

Time: Wednesdays, 2:35 – 5:35

Room: MS3-041

Course Instructor: TBA

Course Description:

This course follows the Big Bang to the Anthropocene course (ENVR 630) which is principally concerned with the biogeochemical evolution of the Universe, and the relationship between this Creation narrative and the Judeo-Christian-Muslim narrative which underlies and legitimates much of Western Culture. "Into the Ecozoic" takes as its starting point that this culture and much of Western higher education serve to legitimate and facilitate the accelerating decline in life's Earthly prospects, sometimes referred to as the Anthropocene. The "Ecozoic" refers to a human/Earth relationship that is mutually beneficial, rather than one based principally on use. Students study selected historic western figures leaning toward Ecozoic thinking including Johann Wolfgang van Goethe, Benedict de Spinoza, Alexander von Humboldt, Aldo Leopold, Carolyn Merchant, Joanna Macy, Lynn Margulis among many others.

Learning Objectives:

1. Students will become familiar with key concepts and theories related to transformations towards more environmentally just futures.
2. Students will critically discuss theories from social change, transitions and transformations literature on how individual, collective and societal transformations happen.
3. Students will acquire the capacity to analyze processes, dynamics and drivers of transformation in specific contexts as well as to theoretically ground analysis of transformative projects in practice.
4. Using art, field trips, films, the students will imagine what the Ecozoic is and how it may be enabled.
5. Beginning with the overall embedded framing of Ecological Economics, students will discover examples of the Ecozoic from topic areas including *Ecological economics & theories of value, Entropy, Trade, Ecological debt and unequal exchange, Social metabolism and socio-ecological transitions, Environmental Justice, Feminism, Population, Reproductive Justice, Indigenous and decolonial approaches, Nutrition and Agriculture.*

Evaluation:

1. Comments on Textbook: 5%
 - Evaluated on ability to clearly convey ideas, critical analysis and relevance of comments
2. Science Fiction article: 10%
 - Evaluated on originality and ability to convey the underlying message
3. Contribution to jointly co-authored definitions of the Ecozoic: 10%
4. Participation: 10%
 - Evaluated on originality and relevance of comments and contribution to class.
5. Action research project proposal: 25%
 - 10% = clearly defined thesis; 10% = well-supported argument; 5% = clear conclusion
6. Action research project final reflection: 40%

Action research project:

- Students will be expected to engage with real world activities and carry out an action research project.
- Options can include: 1) Project with sustainable McGill, 2) Pre-internship project with host institution/organization, 3) Other proposed project from student.

Course Structure:

Students will meet once a week in a classroom setting for lectures and discussion. Students will read from a wide range of literature, engage with invited speakers, and work collaboratively through discussion and writing projects.

Course by Week:

1. Decolonizing Knowledge and reforming the university.
2. Grounding the Ecozoic. Roots of Ecozoic thinking.
3. Theories and praxis of Transformation.
4. Power and Transformation – conceptions of power, power analysis.
5. What science for transformation? Revisiting the critique of the academy through thematic readings.
6. What science for transformation 2?
7. Earth Jurisprudence 1.
8. Ecological Economics 1: Basic concepts value, pluralism, --- finance.
9. Ecological Economics 2: Socio-ecological transitions and social Metabolism.
10. Ethics / Environmental Justice 1: Theories of Justice and Re-theorizing EJ.
11. Ethics / Environmental Justice 2: ecologically unequal exchange, ecological debt.
12. Visions of the Ecozoic / Paths to the Pluriverse.
13. Re-finding ourselves, redefining the Ecozoic.

Required Course Outline Statements [in keeping with Senate resolutions]

Language of Submission:

"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives." (Approved by Senate on 21 January 2009)

Academic Integrity:

"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures" (see www.mcgill.ca/students/srr/honest/ for more information). (Approved by Senate on 29 January 2003)

Additional Statements

"The University Student Assessment Policy exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations."

"As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Students with Disabilities, 514-398-6009."

"McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather."

Preliminary Reading List

Ecological economics & theories of value

Georgescu-Roegen, N., 1993. The entropy law and the economic problem. *Valuing the earth: Economics, ecology, ethics*, pp.75-88.

Martinez-Alier, Munda and O'Neill, Weak comparability of values as a foundation of ecological economics, *Ecological Economics* 26, pag 277-286

Kosoy, N. and Corbera, E., 2010. Payments for ecosystem services as commodity fetishism. *Ecological economics*, 69(6), pp.1228-1236.

Temper, L. and Martinez-Alier, J., 2013. The god of the mountain and Godavarman: Net Present Value, indigenous territorial rights and sacredness in a bauxite mining conflict in India. *Ecological Economics*, 96, pp.79-87.

Graeber, D., 2013. It is value that brings universes into being. *HAU: Journal of Ethnographic Theory*, 3(2), pp.219-243.

Entropy, Trade, ecological debt and unequal exchange

Muradian, R. and Martinez-Alier, J., 2001. Trade and the environment: from a 'Southern' perspective. *Ecological Economics*, 36(2), pp.281-297.

Giljum, S. and Eisenmenger, N., 2004. North-South trade and the distribution of environmental goods and burdens: a biophysical perspective. *The Journal of Environment & Development*, 13(1), pp.73-100.

Foster, J.B. and Holleman, H., 2014. The theory of unequal ecological exchange: a Marx-Odum dialectic. *Journal of Peasant Studies*, 41(2), pp.199-233.

Hornborg, A., 1998. Towards an ecological theory of unequal exchange: articulating world system theory and ecological economics. *Ecological economics*, 25(1), pp.127-136.

Warlenius, R., Pierce, G. and Ramasar, V., 2015. Reversing the arrow of arrears: The concept of "ecological debt" and its value for environmental justice. *Global Environmental Change*, 30, pp.21-30.

Muradian, R., O'Connor, M. and Martinez-Alier, J., 2002. Embodied pollution in trade: estimating the 'environmental load displacement' of industrialised countries. *Ecological Economics*, 41(1), pp.51-67.

Social metabolism and socio-ecological transitions

Fischer-Kowalski, M. (1997). "Society's metabolism: origins and development of the material flow paradigm." From *Paradigm to Practice of Sustainability*, vol. 21, p. 15.

Martinez-Alier, J., Kallis, G., Veuthey, S., Walter, M. and Temper, L., 2010. Social metabolism, ecological distribution conflicts, and valuation languages. *Ecological Economics*, 70(2), pp.153-158.

Haberl, H., Fischer-Kowalski, M., Krausmann, F., Martinez-Alier, J. and Winiwarter, V., 2011. A socio-metabolic transition towards sustainability? Challenges for another Great Transformation. *Sustainable development*, 19(1), pp.1-14.

Singh, S.J., Grünbühel, C.M., Schandl, H. and Schulz, N., 2001. Social metabolism and labour in a local context: changing environmental relations on Trinket Island. *Population and Environment*, 23(1), pp.71-104.

Krausmann, F., Schandl, H. and Siefert, R.P., 2008. Socio-ecological regime transitions in Austria and the United Kingdom. *Ecological Economics*, 65(1), pp.187-201.

Fischer-Kowalski, M., Rovenskaya, E., Krausmann, F., Pallua, I. and Mc Neill, J.R., 2018. Energy transitions and social revolutions. *Technological Forecasting and Social Change*.

Proposals / Visions of the Ecozoic from ecological economics

Kallis, G., Kostakis, V., Lange, S., Muraca, B., Paulson, S. and Schmelzer, M., 2018. Research on degrowth. *Annual Review of Environment and Resources*, (0).

Van den Bergh, J.C., 2011. Environment versus growth—A criticism of "degrowth" and a plea for "a-growth". *Ecological economics*, 70(5), pp.881-890.

Hornborg, A., 2017. How to turn an ocean liner: a proposal for voluntary degrowth by redesigning money for sustainability, justice, and resilience. *Journal of Political Ecology*, 24(1), pp.623-632.
<https://journals.uair.arizona.edu/index.php/JPE/article/view/20900>

<https://www.lowtechmagazine.com>

Environmental Justice

The 17 principles of Environmental Justice *National People of Color Environmental Leadership Summit[<http://www.ejnet.org/ej/principles.pdf>]*. 1991.

Fraser, N., 1995. From redistribution to recognition? Dilemmas of justice in a 'post-socialist' age. *New left review*, pp.68-68.

Lake, R.W., 1996. Volunteers, NIMBYs, and environmental justice: dilemmas of democratic practice. *Antipode*, 28(2), pp.160-174.

Rector, J., 2018. The Spirit of Black Lake: Full Employment, Civil Rights, and the Forgotten Early History of Environmental Justice. *Modern American History*, 1(1), pp.45-66.

Pellow, D. N. Toward a critical environmental justice studies: Black Lives Matter as an environmental justice challenge. *Du Bois Review: Social Science Research on Race* 13, no. 2 (2016): 221-236.

Sikor, T., & Newell, P. (2014). Globalizing environmental justice? *Geoforum*, (54), 151-157.

Newell, P. (2005). "Race, class and the global politics of environmental inequality." *Global Environmental Politics*, vol. 5(3), pp. 70-94.

Schlosberg, D. (2013). "Theorising environmental justice: the expanding sphere of a discourse." *Environmental Politics*, vol. 22, pp. 37-55.

Martinez-Alier, J., Temper, L., Del Bene, D. and Scheidel, A., 2016. Is there a global environmental justice movement?. *The Journal of Peasant Studies*, 43(3), pp.731-755.

Temper, L., Walter, M., Rodriguez, I., Kothari, A. and Turhan, E., 2018. A perspective on radical transformations to sustainability: resistances, movements and alternatives. *Sustainability Science*, 13(3), pp.747-764.

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New Course Proposal Form

(2013)

1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Teaching Department:	<input style="width: 90%;" type="text" value="Natural Resource Sciences"/>	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify) <input style="width: 90%;" type="text" value="Macdonald, Field Location"/>
3. Administering Faculty/Unit:	<input style="width: 90%;" type="text" value="Graduate and Postdoctoral Studies"/>	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term: <input style="width: 90%;" type="text" value="201905"/>
6. Responsible Instructor	<input style="width: 90%;" type="text" value="Peter G Brown"/>	7. Course Title (Limit 30 Characters) - required for all courses: <input style="width: 90%;" type="text" value="Restoring a Flourishing Earth"/>
9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters); <small>Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.</small>	<input style="width: 90%;" type="text" value="Restoring a Flourishing Earth"/>	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: <input style="width: 90%;" type="text" value="NRSC 621"/> Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)
10. Credit Weight (or CEU's for non-credit CE courses):	<input style="width: 90%;" type="text" value="3"/>	11. Rationale for new course <div style="border: 1px solid black; padding: 5px;"> <p>This course will be one of four courses to be taken by students accepted into the "Leadership for the Ecozoic" project. The first two courses introduce students to theoretical frameworks; the last two courses allow students to apply their knowledge. This proposed new course is the third course that is designed to allow students to apply their theoretical knowledge to real world problems in the field. This new course has previously been a special topics course that has been offered by the Department of NRS (2015-2018). This course and its topics are not offered elsewhere in the Department or the university and is an essential component of the Leadership for the Ecozoic project.</p> </div>
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline)		
<div style="border: 1px solid black; padding: 5px;"> <p>Application of the "Ecozoic" framing to real-world problems. Delivered as a field course that provides hands-on experience related to a particular problem due to climate change and other human activities. Activities are designed in consultation with university instructors, government, non-governmental organizations, communities of practice and other key stakeholders.</p> </div>		
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes.		
<div style="border: 1px solid black; padding: 5px;"> <p>Designed for students in the "Leadership for the Ecozoic" project; offered jointly with students from the University of Vermont; combination of classroom and field experiences.</p> </div>		

14. Schedule Types(s):
 (Enter all that apply – see course guidelines for a complete list.)
 (i.e. Lecture, Labs, Tutorial)

Hours per Week		Hours per Week		Hours per Week
Lecture (A)	2	Field Course (F)	3	
Discussion/seminar (M)	5			

Total Hours per Week: 10

Total Number of Weeks: 4

15. Projected Enrolment:

15

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)
 Specify course number(s) or name(s) of test(s):

ENVR 630, NRSC 620

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
 Specify course number(s) and title(s):

None

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

Permission from instructor; not open to students who have taken special topics course NRSC 684 (Economics for the Anthropocene Field Course)

20. Consultation Reports Attached
 Yes N/A


21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee (e.g. screening fee)	Amount
None	

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

INFORMATION FOR ENROLMENT SERVICES		
<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%; margin-top: 5px;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit : <div style="border: 1px solid black; width: 100%; height: 20px; margin-top: 5px;"></div></p> <p>CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px; margin-top: 5px;"></div></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	Brian Driscoll	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<i>M. E. Scott</i>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Signature	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<i>M. E. Scott</i>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Date	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	13 December 2018	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<i>2019-01-07</i>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Departmental Contact Person (name/phone/email)	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>					

Restoring a Flourishing Earth
Course in the Department of Natural Resource Sciences
NRSC 621 Summer session

Prerequisites: ENVR 630 and NRSC 620

Time: Four week intensive course

Room: MS3-041

Course Instructor: TBA

Course Description:

The Leadership for the Ecozoic (L4E) summer field course is an annual, interdisciplinary, collaborative, problem-based training. Preceded by the Big Bang to the Anthropocene course (ENVR630) and Into the Ecozoic course (NRSC620), it is the third L4E course. Aiming to apply the "Ecozoic" framing to real-world problems, it is delivered as a field course that provides hands-on experience related to a particular problem due to climate change, industrial agriculture, the global trading system and other human activities. Student activities are designed in consultation with university instructors, government, non-governmental organizations, communities of practice and other key stakeholders. The field course will take place on location at a site that facilitates the envisioning of the Ecozoic and helps bridge academic, advocacy, and policy/management communities. Each year a different theme will be chosen; for example plastics in the ocean, deforestation, population etc.

Learning Objectives:

1. Students will apply ecological economics and related theories to on-the-ground situations using a transdisciplinary approach to define problems and propose solutions.
2. Students will develop an appreciation for the complex dynamics of the situation by engaging with key human and other stakeholders.
3. Students will practice clearly articulating their ideas of new pathways to the Ecozoic to a diverse, multidisciplinary audience, using different methods of communication such as papers, oral presentations, short podcasts etc.

Evaluation:

1. Online weekly assignments: 5%
2. Annotated bibliography: 20%
 - A minimum of 15 papers are expected
3. Personal reflection: 5%
4. Class participation: 10%
 - Evaluated on originality and relevance of comments and contribution to class.

5. Oral presentation of work: 10%
 - Evaluated on ability to clearly convey ideas that are well-supported and well-formed
6. Final paper: 50%
 - 10% = clearly defined thesis; 30% = well-supported argument; 10% = clear conclusion
 - Topic, to be approved by instructor, must be of a quality that would be required for student's qualifying exam.
 - The paper must include a clear thesis with support for the argument for the thesis with empirical information and/or conceptual argument from documented sources, and be fully referenced using a standard referencing format.

Field Course Structure:

The class will develop over a 4-week period. The first 2 weeks, the class will meet in person and online (via Zoom) with selected stakeholders; there will be class discussions, readings, and weekly assignments. The third week, students will go on location and engage with stakeholders. The fourth week will comprise completion of papers for submission.

Week 1

- Problem definition.
- Familiarity with stakeholder groups and positions.
- Initial brainstorming on topic areas for collaborative, synthesis papers.
- Three online discussion posts to complete.

Week 2

- Scoping of synthesis papers, with goal of developing 3 work groups centered on writing 3 synthesis papers.
- Synthesis frameworks, tools, and examples discussed during lunch-time talks.

Week 3

- Engagement with government agencies, non-profits, research community, and community stakeholders.
- Monday through Thursday will be spent working in teams, pooling resources, and drafting papers.

Week 4

- Complete papers through online collaboration.
- Identification of publication and presentation outlets.
- Papers due. Send for extended peer review.
- Final presentations to selected stakeholders.

Required Course Outline Statements [in keeping with Senate resolutions]

Language of Submission:

"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives." (Approved by Senate on 21 January 2009)

Academic Integrity:

"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures" (see www.mcgill.ca/students/srr/honest/ for more information). (Approved by Senate on 29 January 2003)

Additional Statements

"The University Student Assessment Policy exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations."

"As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Students with Disabilities, 514-398-6009."

"McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather."



New Course Proposal Form

(2013)

1. Will this new course affect a current program?
If "yes", has a Program Revision Form been submitted concurrently?

Yes No
Yes No

2. Teaching Department:
Natural Resource Sciences

3. Administering Faculty/Unit:
Graduate and Postdoctoral Studies

6. Responsible Instructor
Peter G Brown

4. Campus
(Downtown, Macdonald, Off Campus, Distance Ed, Other - specify)

Macdonald

5. Effective Term of Implementation
(Ex. Sept. 2004 = 200409)

Term:

201905

7. Course Title (Limit 30 Characters) - required for all courses:

Seminar for the Ecozoic

9. Course Title to Appear in the eCalendar (optional)
(Limit 59 characters):

Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.

Seminar for the Ecozoic

10. Credit Weight
(or CEU's for non-credit CE courses):

3

8. Course Number(s)
Indicate course number & the number of terms spanned:
(tick all that apply)

Subject/course number: NRSC 622

Course(s) Span:

- 1 term
- 2 consecutive terms (D1, D2)
- 2 non-consecutive terms (N1, N2)
- 3 consecutive terms (J1, J2, J3)

11. Rationale for new course

This course will be one of four courses to be taken by students accepted into the "Leadership for the Ecozoic" project. The first two courses introduce students to theoretical frameworks; the last two courses allow students to apply their knowledge. This course is the fourth course that allows students to apply their theoretical and practical knowledge to the development of a seminar course. Students will develop the framework for the course in the summer session and will facilitate the course in the fall. This new course has previously been a special topics course that has been offered by the Department of NRS (2015-2018). This student-led seminar course is not offered elsewhere in the Department or the university and is an essential component of the Leadership for the Ecozoic project.

12. Course Description

(as it will appear in the eCalendar [maximum 100 words]):
(N.B. Faculty of Medicine must append complete course outline)

Student-led seminar provides opportunity to develop skills in course development and to apply theory and practical experience to examination of one or more thought systems such as economics and finance; law and governance, and ethics and ontology and how it should be rethought in light of the Ecozoic.

13. Supplementary information to appear in the eCalendar in addition to the course description.
Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc.
Please enter the information as it should appear in the calendar notes.

Designed for students in the "Leadership for the Ecozoic" project

14. Schedule Types(s):
(Enter all that apply – see course guidelines for a complete list.)
(i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
Discussion/seminar (M)	2		
Independent Study (IS)	1		
Total Hours per Week:			3
Total Number of Weeks:			15

15. Projected Enrolment:

15

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)
Specify course number(s) or name(s) of test(s):

ENVR 630, NRSC 620

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
Specify course number(s) and title(s):

NRSC 621

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

Permission from instructor; not open to students who have taken special topics course NRSC 685 (Economics for the Anthropocene Student-led Seminar)

20. Consultation Reports Attached
 Yes N/A

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee (e.g. screening fee)	Amount
None	

INFORMATION FOR ENROLMENT SERVICES

To be completed by the Faculty

Slot Course: Yes No

Thesis Component: Yes No

To be completed by ES
CIP Code



For Continuing Studies Use

CS Admin. Unit :

CS Non-Grant Courses:

Flat Rate: CdnFlat Rate: Yes N/A

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	<input type="text"/>	Brian Driscoll	<input type="text"/>	M.E. Scott	<input type="text"/>	<input type="text"/>
Signature	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>
Date	<input type="text"/>	14 Dec 2018	<input type="text"/>	2019-01-28	<input type="text"/>	<input type="text"/>
Departmental Contact Person (name/phone/email)	<input type="text"/>					

SEMINAR FOR THE ECOZOIC
(Finding our way to mutually beneficial human/Earth relationships)

Course in the Department of Natural Resource Sciences
NRSC 622 Summer and Fall sessions

Prerequisites: ENVR 630 and NRSC 620 and permission from course instructor

Co-requisite: NRSC 621 (or NRSC 684)

Restriction: Not open to students who have taken NRSC 685 (Economics for the Anthropocene Student-led Seminar)

Time: Thursdays, 2:35 – 5:35

Room: MS3-041

Course Instructor: TBA

COURSE DESCRIPTION:

Student-led seminar provides opportunity to develop skills in course development and to apply theory and practical experience to examination of one or more thought systems such as economics and finance; law and governance; and ethics and ontology and how it or they should be rethought and/or abandoned in light of the Ecozoic.

LEARNING OBJECTIVES:

During the summer phase,

1. Students will apply theory and on-the-ground experience to the development of a seminar course designed to rethink the human-Earth relationship.
2. Students will gain experience in designing a course using a transdisciplinary approach, in identifying topics and relevant readings that need to be considered, and in selecting and inviting a few experts in relevant fields of research and practice to join the class remotely.

During the fall phase,

3. Students will practice applying knowledge gained through readings and class discussions in transdisciplinary collaboration and respectful discussion while clearly articulating and critiquing ideas for pathways to the Ecozoic.
4. Students will receive and give peer evaluation.
5. Students will gain experience in writing a transdisciplinary paper to be submitted to a journal for peer review; the paper may be a collaborative effort.

SEMINAR OVERVIEW:

The course focusses on critique of the present literature on the Ecozoic with identification of gaps, with proposed solutions. Students discuss how their interests intersect and define the elements required to develop a seminar course on their chosen topic. A Faculty mentor provides guidance to students regarding topic definition, learning activities and evaluation methods, thereby giving students personal agency over their learning. Students explore and

investigate topics through learning activities which may include group discussions, research papers, presentations, guest lectures and applied problem-solving. Rethinking the human-Earth relationship and the vast changes it will entail is the massive challenge humanity faces as the pace and scale of planetary decline gains very more alarming momentum. The norms that guided us in the relatively quiet past are not even remotely up the stormy future already underway. In short, this course is designed to rethink our future and that of our planet.

EVALUATION:

Phase	Assessment	Value
Summer phase	Course development	15%
Fall phase	"Prof for the Day"	15%
	Class discussions	10%
	Final paper	50%
	Reflection and agenda for action	10%
	<i>Total</i>	<i>100%</i>

Course development: 15%

Final syllabus – 5%

Class will receive a group mark based on quality of final syllabus, which includes all modules, submitted in August.

Personal contribution – 10%

Each student will be evaluated on originality and contribution to course development, based on engagement during course development and personal contribution to overall direction of course, course syllabus and course content, including the specific module(s) they developed.

"Prof for the Day": 15%

Seminar leadership – 10%

Each student will be evaluated on the delivery of their module(s) and their ability to clearly convey ideas that are well-supported and well-formed.

Peer evaluation – 5%

Students reflect upon and evaluate the work of their peer as "Prof for the Day".

Class discussions: 10%

Each student will be evaluated on originality and relevance of comments and contribution to those classes where they are not the "Prof for the Day".

Final paper: 50%

10% = clearly defined thesis; 30% = well-supported argument; 10% = clear conclusion
Topic to be approved by instructor; paper may be a joint submission. The paper, to be transdisciplinary in nature, must include a clear thesis with support for the argument for the thesis with empirical information and/or conceptual argument from documented sources, and be fully referenced using a standard referencing format.

Reflection and agenda for action: 10%

Students will each submit a reflection of no more than 1,000 words that addresses the following questions:

- How has the course impacted you and informed your agenda for action?
- Did the course meet expectations? Why or why not?
- What would you have done differently?

COURSE STRUCTURE:

Summer phase. During the summer, students meet with course mentor for three one-hour sessions to develop the course. First, students select a topic of interest. Then they decide on a series of modules that address topics needed to discuss at a deep level points of intersection relevant to the selected topic for the course. Each student takes responsibility for a module and develops a detailed description of why the module is relevant to the topic of the course, a rationale for its inclusion in the course, learning objectives, a reading list (book chapters, journal articles, etc.), a video list and a list of potential guest speakers (online or in person). The proposed modules are submitted altogether as a course syllabus in August. The syllabus will follow McGill's guidelines for course outlines developed by Teaching and Learning Services and will be evaluated by course mentor.

Fall phase. During the fall, students complete the modules developed in the summer. Each class period involves a combination of student presentations and/or presentations by guest speakers and facilitated class discussions. Each student is responsible for all activities associated with their module(s). This includes preparing and delivering content and facilitation of discussion. In situations where there is a guest speaker, the student will introduce and liaise with the speaker and will draw links between course material (other speakers/topics/readings) and contributions from the guest. The course mentor evaluates all components with the exception of the peer evaluation.

Required Course Outline Statements [in keeping with Senate resolutions]

Language of Submission:

"In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. This does not apply to courses in which acquiring proficiency in a language is one of the objectives." (Approved by Senate on 21 January 2009)

Academic Integrity:

"McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures" (see www.mcgill.ca/students/srr/honest/ for more information). (Approved by Senate on 29 January 2003)

Additional Statements

"The University Student Assessment Policy exists to ensure fair and equitable academic assessment for all students and to protect students from excessive workloads. All students and instructors are encouraged to review this Policy, which addresses multiple aspects and methods of student assessment, e.g. the timing of evaluation due dates and weighting of final examinations."

"As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Students with Disabilities, 514-398-6009."

"McGill University is on land which has long served as a site of meeting and exchange amongst Indigenous peoples, including the Haudenosaunee and Anishinabeg nations. We acknowledge and thank the diverse Indigenous people whose footsteps have marked this territory on which peoples of the world now gather."



1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Teaching Department: <input type="text" value="Food Science & Agricultural Chemistry"/>	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify) <input type="text" value="Macdonald"/>	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term: <input type="text" value="Winter 2020"/>
3. Administering Faculty/Unit: <input type="text" value="Agr Env Sciences"/>		
6. Responsible Instructor <input type="text" value="To Be Determined"/>		
7. Course Title (Limit 30 Characters) - required for all courses: <input type="text" value="Introduction to Cannabis"/>	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: <input type="text" value="FDSC 475"/> Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)	
9. Course Title to Appear In the eCalendar (optional) (Limit 59 characters): Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above. <input type="text" value="Introduction to Cannabis and Cannabinoids"/>		
10. Credit Weight (or CEU's for non-credit CE courses): <input type="text" value="3"/>		
11. Rationale for new course <input type="text" value="Medicinal cannabis production targets the optimization of cannabinoids that possess medicinal properties and or control of cannabinoid content with various ratios of CBD vs THC. Understanding the chemical composition of cannabinoids and methods of their extraction, analysis and identification techniques are essential competencies needed towards successful production of medicinal cannabis."/>		
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline) <input type="text" value="The chemistry, metabolic pathways of formation and biological activity and health benefits of phytochemicals in Cannabis plants. Extraction, classification, and analysis of bioactive components in Cannabis plants."/>		
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes. <input type="text"/>		

14. Schedule Types(s):
 (Enter all that apply – see course guidelines for a complete list.)
 (i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
A - Lectures	3		
Total Hours per Week:			3
Total Number of Weeks:			13

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources?
 Yes No

17. Prerequisite(s) (Courses or Tests)
 Specify course number(s) or name(s) of test(s):

FDSC 230 or LSCI 211

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
 Specify course number(s) and title(s):

PLNT 470, FDSC 476, and FDSC 477

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

Should be enrolled in "Diploma in Commercial Cannabis: Meeting Industry Standards"

20. Consultation Reports Attached
 Yes N/A

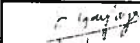

21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee (e.g. screening fee)	Amount

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

INFORMATION FOR ENROLMENT SERVICES		
<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit: <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	Varoujan Yaylayan	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	M.E. Scott	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Signature	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Date	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	January 29, 2019	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	2019-01-07	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Departmental Contact Person (name/phone/email)	Leslie LaDuke, 398					

**McGILL UNIVERSITY, MACDONALD CAMPUS
DEPARTMENT OF FOOD SCIENCE AND AGRICULTURAL CHEMISTRY**

COURSE OUTLINE

Introduction to Cannabis and Cannabinoids (FDSC 475, 3 credits)

Course description: The origin of the Cannabis plant. The chemistry, metabolic pathways of formation and biological activity and health benefits of phytochemicals in Cannabis plants. Extraction, classification, and analysis of bioactive components in Cannabis plants.

Rationale: Medicinal cannabis production targets the optimization of cannabinoids that possess medicinal properties and or control of cannabinoid content with various ratios of CBD vs THC. Understanding the chemical composition of cannabinoids and methods of their extraction, analysis and identification techniques are essential competencies needed towards successful production of medicinal cannabis.

Objectives: After successful completion of this course, students will be able to:

1. Understand the chemistry of phytochemicals in Cannabis plants, their metabolic pathways of formation and biological activities
2. Gain an understanding on the health benefits of each of the phytochemical groups
3. Become familiar with the current methods of extraction and structural identification
4. Communicate knowledge related to phytochemistry of Cannabinoids

Course Weight: 3 credits course, three hours lectures

Instructor: XXXX: Office: XXXX Tel.: XXXXX, E-mail: XXXXX

Assessment /Grading Strategy

Students will be assessed by the following modes:

Midterm 1	(25%)
Mid-term 2	(25%)
Final exam	(50%)

Course outline

1. Introduction to Phytochemicals in Cannabis Plants (Chemistry of Flavonoids, Terpenoids and cannabinoids)
2. Origin and metabolic pathways of formation of cannabinoids.
3. Effect of harvesting, storage, oxidation and processing on the chemical stability and bioactivity of cannabinoids
4. Physical and chemical properties of cannabinoids
5. Methods of extraction, separation, chemical analysis and structural elucidation of important cannabinoids
6. Structure-activity relationships of various cannabinoids
7. Clinical studies

Literature

Abrahams , D and Guzman M. 2015. Cannabis in cancer care. Clin Pharmacol Ther. 2015 Jun; 97(6): 553–558. Published online 2015 Apr 16. doi: [10.1002/cpt.115](https://doi.org/10.1002/cpt.115)

Appendinao G. et al. 2011. Cannabinoids: occurrence and medicinal chemistry. Curr Med Chem. 2011;18(7):1085-99.

Mehan-Atras J. 2017. Toxicant Formation in Dabbing: The Terpene Story. ACS Omega, 2017, 2 (9), pp 6112–6117

Websites

<https://www.canada.ca/en/services/health/campaigns/cannabis.html>

Books

Brian F. Thomas and Mahmoud A. ElSohly. 2016. The Analytical Chemistry of Cannabis. DOI <https://doi.org/10.1016/C2014-0-03861-0>

Brian F Thomas, Mahmoud ElSohly. 2016. Quality Assessment, Assurance, and Regulation of Medicinal Marijuana and Cannabinoid Preparations

INFORMATION

Important: Students are not allowed to use mobile computing and communication devices (laptops, cell phones, blackberries, i-pods, i-pads, etc.) in classes, lab periods and field trips

unless specifically allowed by your teacher. **Please make sure that your cell phone is turned off!**

Students with disabilities: as the instructor of this course we endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with us and the Office for Students with Disabilities at www.mcgill.ca/osd or 514-398-6009. Students already registered with OSD do need to contact them, using the web form, to make arrangements for accommodations for any assessments (midterms, lab exams, in-class essays/finals) that fall outside the official final examination period.

Policy on cheating and plagiarism: McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more details). Please remember that any form of cheating or plagiarism is not acceptable.

Cheating means any dishonest or deceptive practice related to examinations, tests, quizzes, lab assignments, term papers or other forms of evaluation. Cheating includes, but is not restricted to, making use of unauthorized assistance in writing examinations, papers or any other evaluation.

Plagiarism is the intentional copying, paraphrasing or other use of another person's work or ideas without acknowledgement. Plagiarism can be from any source including books, magazines, newspapers, the Internet or another student's work.

Sickness/illness during the term: Please visit Student Services (CC1-124) at Macdonald Campus if you are suffering from any mental or physical health-related issues during the term. If you need to seek accommodation for in-course assignments, for medical or other emergencies, please bring medical documentation to the Student Affairs Office (106 Laird Hall). Details about this procedure are presented here:

<http://www.mcgill.ca/macdonald/studentinfo/medical-notes>

Copy-right: instructor-generated course materials (e.g., handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.



New Course Proposal Form

(2013)

1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Teaching Department: <input type="text" value="Food Science & Agricultural Chemistry"/>	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify) <input type="text" value="Macdonald"/>	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term: <input type="text" value="Winter 2020"/>
3. Administering Faculty/Unit: <input type="text" value="Agr Env Sciences"/>		
6. Responsible Instructor <input type="text" value="To Be Determined"/>		
7. Course Title (Limit 30 Characters) - required for all courses: <input type="text" value="Contaminants in Cannabis"/>	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: <input type="text" value="FDSC 476"/> Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)	
9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters): Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above. <input type="text" value="Contaminants in Cannabis"/>		
10. Credit Weight (or CEU's for non-credit CE courses): <input type="text" value="3"/>		
11. Rationale for new course <input type="text" value="Contaminated cannabis products may pose food safety and public health risk and thus, it is important to study and understand the contaminants in cannabis. Knowledge on biology/chemistry, classification and testing of these contaminants will help trainees to identify them and knowledge of quality assurance procedures will help them in mitigating microbial, chemical, and physical contaminants during production/processing of Cannabis and its products. This competence development would help in reducing the concerns over the food safety and public health due to contaminants in cannabis."/>		
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline) <input type="text" value="Cannabis and its products are prone to contamination owing to improper handling and cross contamination during the production/processing. Cannabis may get contaminated by various microbes viz. bacteria, fungi, viruses as well as parasites along with heavy metals and pesticides. This course will cover the basic concepts of various contaminants in cannabis viz. their sources, basic biology/chemistry, classification and testing of various contaminants, method validation and quality assurance procedures to avoid microbial/chemical contamination."/>		
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes. <input type="text" value="Language of instruction is English"/>		

14. Schedule Types(s):
 (Enter all that apply – see course guidelines for a complete list.)
 (i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
A - Lectures	3		
Total Hours per Week:			3
Total Number of Weeks:			13

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources?
 Yes No

17. Prerequisite(s) (Courses or Tests)
 Specify course number(s) or name(s) of test(s):

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
 Specify course number(s) and title(s):

PLNT 470, FDSC 475, FDSC 477

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

Enrolled in Diploma in Commercial Cannabis: Meeting Industry Standards

20. Consultation Reports Attached
 Yes N/A

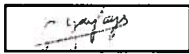

21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee (e.g. screening fee)	Amount

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

INFORMATION FOR ENROLMENT SERVICES		
To be completed by the Faculty Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No	To be completed by ES CIP Code <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	For Continuing Studies Use CS Admin. Unit : <div style="border: 1px solid black; width: 100%; height: 20px;"></div> CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px;"></div> Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	Varoujan Yaylayan	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	M. E. Scott	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
Signature	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>		<div style="border: 1px solid black; width: 100%; height: 20px;"></div>	<div style="border: 1px solid black; width: 100%; height: 20px;"></div>
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Departmental Contact Person (name/phone/email)	Ms Leslie LaDuke/8615/leslie.laduke@mcgill.ca					

**McGILL UNIVERSITY, MACDONALD CAMPUS
DEPARTMENT OF FOOD SCIENCE AND AGRICULTURAL CHEMISTRY**

COURSE OUTLINE

Contaminants of Cannabis (FDSC 476, 3 credits)

Course description: Cannabis and its products are prone to contamination owing to improper handling and cross contamination during the production/processing. Cannabis may get contaminated by various microbes viz. bacteria, fungi, viruses as well as parasites along with heavy metals and pesticides. This course will cover the basic concepts of various contaminants in cannabis viz. their sources, basic biology/chemistry, classification and testing of various contaminants, method validation and quality assurance procedures to avoid microbial/chemical contamination.

Rationale: Contaminated cannabis products may pose food safety and public health risk and thus, it is important to study and understand the contaminants in cannabis. Knowledge of biology/chemistry, classification and testing of these contaminants will help trainees to identify them and knowledge of quality assurance procedures will help them in mitigating microbial, chemical and physical contaminants during production/processing of Cannabis and its products. This competence development would help in reducing the concerns over the food safety and public health due to contaminant in cannabis.

Objectives and Outcome: By the end of the course, students will have basic knowledge of the various types of contaminants of Cannabis and will be able to:

1. Understand the basic biology/chemistry of various contaminants in cannabis.
2. Know the classification of various contaminants in cannabis.
3. Know the testing of various contaminants in cannabis.
4. Select an appropriate strategy for the analysis of a range of contaminants in cannabis
5. Design an analytical quality control program and interpret analytical performances for the quantification of chemical contaminants in cannabis
6. Understand the quality assurance procedures to avoid microbial contamination in cannabis.

Course Weight: 3 credits course, three hours lectures

Instructor: XXXX: Office: XXXX Tel.: XXXXX, E-mail: XXXXX

Assessment /Grading Strategy

Students will be assessed by the following modes:

Midterm 1	(25%)
Mid-term 2	(25%)
Final exam	(50%)

Course outline

Course content for 12 weeks:

Week 1: Introduction to various contaminants in cannabis.

Week 2: Bacterial contaminants in cannabis, their classification and testing procedures.

Week 3: Viral contaminants in cannabis, their classification and testing procedures.

Week 4: Fungal contaminants in cannabis, their classification and testing procedures.

Week 5: Regulatory requirements of microbial testing of cannabis in Canada.

Week 6: Quality assurance procedures to reduce microbial contaminants in cannabis.

Week 7: Heavy metals: definition and sources in cannabis.

Week 8: Analysis of metals in cannabis.

Week 9: Pesticides and cannabis production.

Week 10: Analysis of pesticide residues in cannabis.

Week 11: Mass spectrometry and contaminants in cannabis.

Week 12: Analytical quality assurance & method validation.

Literature

McPartland, J. M., & McKernan, K. J. (2017). Contaminants of Concern in Cannabis: Microbes, Heavy Metals and Pesticides. In S. Chandra, H. Lata, & M. A. ElSohly (Eds.), *Cannabis sativa L. – Botany and Biotechnology* (pp. 457-474). Cham: Springer International Publishing.

Scott, M., Rani, M., Samsatly, J., Charron, J. B., & Jabaji, S. (2018). Endophytes of industrial hemp (*Cannabis sativa L.*) cultivars: identification of culturable bacteria and fungi in leaves, petioles, and seeds. *Can J Microbiol*, 64(10), 664-680. doi:10.1139/cjm-2018-0108

Websites

The Access to Cannabis for Medical Purposes Regulations (ACMPR). Available at <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-230/page-8.html#docCont>

Cannabis industry guidelines and requirements. Health Canada. <https://www.canada.ca/en/health-canada/services/cannabis-regulations-licensed-producers.html>

Hazard Analysis and Critical Control Point/Food Safety Enhancement Program. Canadian Food Inspection Agency. <http://www.inspection.gc.ca/english/fssa/polstrat/haccp/haccpe.shtml>

Codex Alimentarius Commission, Food Agriculture Organisation/World Health Organisation. <http://www.fao.org/fao-who-codexalimentarius/en/>

Books

Baker, S., Nicklin, J., Griffiths, C. (2011). BIOS Instant Notes in Microbiology. London: Taylor & Francis. ISBN: 9780203808313

Besterfield, D.H. (2009). Quality Control 8th Edition. Pearson Prentice Hall, Columbus, Ohio. ISBN: 9780135000953

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1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>	
2. Teaching Department:	<input style="width: 100%;" type="text" value="Food Science & Agricultural Chemistry"/>	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify)	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term:
3. Administering Faculty/Unit:	<input style="width: 100%;" type="text" value="Agr Env Sciences"/>	<input style="width: 100%;" type="text" value="Macdonald"/>	<input style="width: 100%;" type="text" value="Winter 2020"/>
6. Responsible Instructor	<input style="width: 100%;" type="text" value="To Be Determined"/>	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: <input style="width: 100%;" type="text" value="FDSC 477"/> Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)	
7. Course Title (Limit 30 Characters) - required for all courses:	<input style="width: 100%;" type="text" value="Cannabis Product Design / Development"/>		
9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters): Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.	<input style="width: 100%;" type="text" value="Introduction to Cannabis Product Design and Development"/>		
10. Credit Weight (or CEU's for non-credit CE courses):	<input style="width: 100%;" type="text" value="3"/>		
11. Rationale for new course			
<input style="width: 100%; height: 100%;" type="text" value="The cannabis industry needs to innovate to adopt traditional pharmaceutical practices in order to continue making scientific advancements and to normalize cannabis as a medicine or as nutraceutical or as food products. A basic course on the development of Cannabis products is essential to ensure an efficient formulation, delivery and stability of bioactive compounds of the cannabis-based products."/>			
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline)			
<input style="width: 100%; height: 100%;" type="text" value="This course provides the unique understanding of the fundamental principles needed to develop new food products from concept, to design, to formulation and to production, as applied to Cannabis products. The technical challenges, associated with the formulation of cannabis-based products, as well as the considerations for an optimal formulation will be covered."/>			
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes.			
<input style="width: 100%; height: 100%;" type="text" value="Language of instruction is English"/>			

14. Schedule Types(s):

(Enter all that apply – see course guidelines for a complete list.)
(i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
A - Lectures	3		
Total Hours per Week:			3
Total Number of Weeks:			13

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?

Yes No

The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)

Specify course number(s) or name(s) of test(s):

If the student does not have a prerequisite should web registration be blocked?

Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?

Yes No

18. Corequisite(s) Course Number(s):

Specify course number(s) and title(s):

PLNT 470, FDSC 475, FDSC 476

If the student does not register for the corequisite in the same term should web registration be blocked?

Yes No

19. Restriction(s):

Enrolled in Diploma in Commercial Cannabis: Meeting Industry Standards

20. Consultation Reports Attached

Yes N/A

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)

Yes No

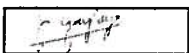
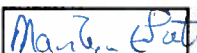
21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee
(e.g. screening fee)

Amount

INFORMATION FOR ENROLMENT SERVICES		
<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit : <input type="text"/></p> <p>CS Non-Grant Courses: <input type="text"/></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	<input type="text"/>	Varoujan Yaylayan	<input type="text"/>	M.E. Scott	<input type="text"/>	<input type="text"/>
Signature	<input type="text"/>		<input type="text"/>		<input type="text"/>	<input type="text"/>
Date	<input type="text"/>	January 29, 2019	<input type="text"/>	2019-01-07	<input type="text"/>	<input type="text"/>
Departmental Contact Person (name/phone/email)	Leslie LaDuke/8615/leslie.laduke@mcgill.ca					

**McGILL UNIVERSITY, MACDONALD CAMPUS
DEPARTMENT OF FOOD SCIENCE AND AGRICULTURAL CHEMISTRY
COURSE OUTLINE**

**Introduction to Cannabis Product Design and Development
(FDSC 477, 3 credits)**

Course Description: This course provides the unique understanding of the fundamental principles needed to develop new food products from concept, to design, to formulation and to production, as applied to Cannabis products. The technical challenges, associated with the formulation of cannabis-based products, as well as the considerations for an optimal formulation will be covered.

Rational:

Ideation, development and Innovation for the growing cannabis industry are challenging. There is a need for the understating of the technical considerations for the cannabis-based formulations as a medicine or as nutraceutical or as food products. A basic course on the development of Cannabis products is essential to ensure an efficient formulation, delivery and stability of bioactive compounds of the cannabis-based products.

Measurable Learning Outcomes:

- The students will become familiar with the process for the development of new food products from market/marketplace perspectives.
- The students will be able to develop the understanding of the technical aspects of cannabis-based product development.
- The students will be able to select the appropriate ingredients for the cannabis-based formulations.
- The students will be familiar with the challenges associated with the cannabis formulations and with the best practices for an efficient formulation, delivery and stability.

Course Weight: 3 credits course, three hours lectures

Instructor: XXXX: Office: XXXX Tel.: XXXXX, E-mail: XXXXX

Assessment Category

Students will be assessed by the following modes:

Midterm 1	(25%)
Mid-term 2	(25%)
Final exam	(50%)

Semester Given: Winter

Topics Covered

1. ELEMENTS FOR THE DESIGN AND THE DEVELOPMENT OF NEW CANNABIS-BASED PRODUCTS

- Classification of New Cannabis-based Products
- Market and Marketplace Analysis
- Business Strategy Considerations
- Product Life Cycle
- What Determines the Product Failure and Success?

2. Food PRODUCT DEVELOPMENT PROCESS

- Process from the generation of Product Ideas to product Concept and Design
- Ingredient Functions and Selection for an efficient formulation of cannabis-based products
- Product Formulation and Optimization
- Process Design
- Shelf-life testing

INFORMATION

Important: Students are not allowed to use mobile computing and communication devices (laptops, cell phones, blackberries, i-pods, i-pads, etc.) in classes, lab periods and field trips unless specifically allowed by your teacher. **Please make sure that your cell phone is turned off!**

Students with disabilities: as the instructor of this course we endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with us and the Office for Students with Disabilities at www.mcgill.ca/osd or 514-398-6009. Students already registered with OSD do need to contact them, using the web form, to make arrangements for accommodations for any assessments (midterms, lab exams, in-class essays/finals) that fall outside the official final examination period.

Policy on cheating and plagiarism: McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more details). Please remember that any form of cheating or plagiarism is not acceptable.

Cheating means any dishonest or deceptive practice related to examinations, tests, quizzes, lab assignments, term papers or other forms of evaluation. Cheating includes, but is not restricted to, making use of unauthorized assistance in writing examinations, papers or any other evaluation.

Plagiarism is the intentional copying, paraphrasing or other use of another person's work or ideas without acknowledgement. Plagiarism can be from any source including books, magazines, newspapers, the Internet or another student's work.

Sickness/illness during the term: Please visit Student Services (CC1-124) at Macdonald Campus if you are suffering from any mental or physical health-related issues during the term. If you need to seek accommodation for in-course assignments, for medical or other emergencies, please bring medical documentation to the Student Affairs Office (106 Laird Hall). Details about this procedure are presented here: <http://www.mcgill.ca/macdonald/studentinfo/medical-notes>

Copy-right: instructor-generated course materials (e.g., handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.



New Course Proposal Form

(2013)

1. Will this new course affect a current program?
If "yes", has a Program Revision Form been submitted concurrently? Yes No
Yes No

2. Teaching Department:

3. Administering Faculty/Unit:

6. Responsible Instructor

4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other - specify)

5. Effective Term of Implementation (Ex. Sept. 2004 = 200409)
Term:

7. Course Title (Limit 30 Characters) - required for all courses:

9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters):
Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.

10. Credit Weight (or CEU's for non-credit CE courses):

8. Course Number(s)
Indicate course number & the number of terms spanned: (tick all that apply)
Subject/course number:
Course(s) Span:
 1 term
 2 consecutive terms (D1, D2)
 2 non-consecutive terms (N1, N2)
 3 consecutive terms (J1, J2, J3)

11. Rationale for new course

With Canada's legalization of recreational cannabis and the growing interest in the field of medicinal cannabis, multiple frontiers are now open that challenge society and industry alike. This course is designed to prepare students for troubleshooting in professional environments dealing with cannabis. The assignments and presentations are strategically sequenced to allow students to slowly gain understanding of the real challenges in the Cannabis field. In continuation, this course would then better equip them during their internship semester in industry with hands on information on dealing with challenges in any of the sectors - Production, Cultivation, Research, Legal, Regulatory, Ethical, Health or Safety.

12. Course Description (as it will appear in the eCalendar [maximum 100 words]):
(N.B. Faculty of Medicine must append complete course outline)

Local, national and international perspectives on issues and concerns regarding Cannabis, with a focus on legal, regulatory, ethical and health and safety aspects relevant to Industry, Government, Academia and Consumers.

13. Supplementary information to appear in the eCalendar in addition to the course description.
Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc.
Please enter the information as it should appear in the calendar notes.

14. Schedule Types(s):
 (Enter all that apply – see course guidelines for a complete list.)
 (i.e. Lecture, Labs, Tutorial)

	Hours per Week		Hours per Week		Hours per Week
A - Lectures	<input type="text" value="1.5"/>	C - Colloquium	<input type="text" value="0.75"/>		<input type="text"/>
PR - Presentation	<input type="text" value="0.75"/>		<input type="text"/>		<input type="text"/>
Total Hours per Week:					<input type="text" value="3"/>
Total Number of Weeks:					<input type="text" value="13"/>

15. Projected Enrolment:

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources?
 Yes No

17. Prerequisite(s) (Courses or Tests)
 Specify course number(s) or name(s) of test(s):

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
 Specify course number(s) and title(s):

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

20. Consultation Reports Attached
 Yes N/A

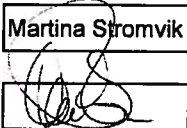
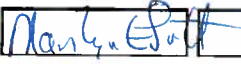
21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee (e.g. screening fee)	Amount
<input type="text"/>	<input type="text"/>

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

INFORMATION FOR ENROLMENT SERVICES		
<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit : <input style="width: 100%;" type="text"/></p> <p>CS Non-Grant Courses: <input style="width: 100%;" type="text"/></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	Martina Stromvik			M.E. Scott		
Signature						
Date	Jan.29,2019			2019-01-07		
Departmental Contact Person (name/phone/email)	Suha jabaji/398-7561/suha.jabaji@mcgill.ca					

McGILL UNIVERSITY, MACDONALD CAMPUS - DEPARTMENT OF PLANT SCIENCE

Winter 2020

Cannabis Issues And Concerns (PLNT 470; 3 credits)

GENERAL INFORMATION

COURSE DESCRIPTION

Local, national and international perspectives on issues and concerns regarding Cannabis, with a focus on legal, regulatory, ethical and health and safety aspects relevant to Industry, Government, Academia and Consumers.



COURSE RATIONALE

With Canada's legalization of recreational cannabis and the growing interest in the field of cannabis, multiple frontiers are now open that challenge society and industry alike. This course is designed to prepare students for troubleshooting in professional environments dealing with cannabis. The assignments and presentations are strategically sequenced to allow students to slowly gain understanding of the real challenges in the Cannabis field. In continuation, this course would then better equip them during their internship semester in industry with hands on information on dealing with challenges in any of the sectors - Production, Cultivation, Research, Legal, Regulatory, Ethical, Health or Safety.

GENERAL INFORMATION

Course Number	PLNT 470
Term	Winter
Year	2020
Course Schedule (per week)	1 lecture (3 hours)
Number of Credits	3
Course Location	TBD

Instructor: XXXX, Office: XXXX, Tel.: XXXXX, Email: XXXXX

INSTRUCTIONAL METHOD

THE COURSE IS DIVIDED INTO 5 SECTIONS ALLOWING STUDENTS TO GAIN A PERSPECTIVE OF ISSUES & CONCERNS PERTAINING TO ALL STAKEHOLDERS IN THE FIELD OF CANNABIS

Lecture Format- The course comprises of a single class a week of 3 hours duration. The lecture duration is divided into 5 parts-

1. Lecture (Professor/Guest Speaker) on current scenario/advances in a designated topic – 1 hour
2. Break- 15 mins
3. 3 to 4 student presentations of assigned papers on designated topic- 1 hour
4. Polling session on class perspective post lecture- 15 mins (Polling @ McGill)
5. Discussion Panel of presenting students and speaker of the day- 30 mins
6. Take home Quizzes – on MyCourses

The Lecture Format of the classes would begin with a speaker (Instructor or Guest) introducing the designated topic of the week and giving an insight into the current issues & concerns for the field, ideally in Canada. This would be followed by student presentations, each presenting a recent published study/review on the same topic. Upon gaining a fair amount of knowledge on the current state of the designated topic, the audience would express their opinions through Polling @ McGill. The polling questions would be designed such as to gain insight on the class perspective while simultaneously giving seeds for the following discussion panel. Based on the responses from polling, the panel of students & speaker would steer the discussion and answer student queries on the topic. The said lecture format would instigate learning through a discussion-based platform.

Assessment strategy and grading scheme- Evaluation will take place through professor and peer evaluations of presented material, professor evaluation of participation in class discussions, a 10-question topic quiz every class, and three written assignments. There would not be any Mid-Terms or Final examinations. Evaluation breakdown is based completely on the following table-

Grading based on-	Description	Weight
Assignment 1	Report on Cannabis in News	10%

Individual Presentation	Assigned topic in alignment with lecture section	15%
Assignment 2	Written Review Article or Written Case study report (one category of issues & concerns in assigned country)	25%
Group Presentation	Comprehensive overview on assigned countries	20%
Quizzes (Total 11)	Topic quizzes (take-home)	10%
Participation (Polling @ McGill)	In class participation	10%
Peer Grading	Grading topic presentations	10%

Assignment 1: writing a 2-page report on a news piece on cannabis would incur a curiosity in the student while giving them a background on current topics.

Assignment 2: the students would be assigned one of the 5 sectors and a country with legalised cannabis. Students would then submit a 10-page review article or a report on a case study on the state of that particular sector in that country (An example: Legal Issues in the USA). Upon the submission of the assignment, the students with the same assigned countries but different sectors would then be combined into groups. They would prepare a presentation to comprehensively describe the current state of these 5 sectors in the assigned country. This would allow for an exchange of information between students ending with a considerable knowledge of each sector in that country. The assessment would be made majorly on the comprehensiveness of the presentation.

The teaching aids like polling and peer grading based on rubrics would result in active participation. Peer grading would also allow the students to critically assess the presented academic material counting as soft skills later.

Policy on Late Assignments and Missed Classes:

Assignments are due at the beginning of the lecture on the assigned dates. Late assignments are not accepted and will result in a mark of 0. Students who are not present for a lecture where they are expected to present a topic and participate on a discussion panel will be assigned a mark of 0 for their presentation and participation for that class

COURSE LECTURE OUTLINE

Section	Class/Topic	Description e.g., topic, content, associated readings, activities.	Assignments and/or Readings Due e.g., quiz, paper, group project, exam.
Industry	1	Introductory Class + Cannabis Industry Overview	
	2	Cannabis Cultivation & Processing issues	
	3	Cannabis Distribution & Retail: Industry & Regulatory Issues	Assignment 1
Regulatory	4	Regulatory overview & challenges	
	5	Role of Consultancies	
Legal (proposed)	6	Banking issues in the USA	
	7	Proposed solutions to the Banking issues in USA (Cryptocurrency?)	
Ethical	8	Ethical issues in cannabis consumption	
	9	Ethical issues in cannabis research	Assignment 2
Health & Safety	10	Health Effects of cannabis consumption: Medicinal & Recreational (Acute & Chronic effects)	
	11	Safety Hazards of cannabis: Cultivation, Storage & Consumption	
Term Presentations	12	Student groups on day 1	
	13	Student groups on day 2	

REFERENCE DATABASE

1. Industry Case Studies

a. Cannabis cultivation & Processing issues- (Yet to search on extraction issues)

- i. Martin Bouchard & Claude B. Dion (2009) Growers and Facilitators: Probing the Role of Entrepreneurs in the Development of the Cannabis Cultivation Industry, *Journal of Small Business & Entrepreneurship*, 22:1, 25-37, DOI: 10.1080/08276331.2009.10593440 Available at: <https://doi.org/10.1080/08276331.2009.10593440>

b. Cannabis Distribution- (Maybe procurement issues too?)

- i. Decorte, T., Pardal, M., Queirolo, R., Boidi, M. F., Sánchez Avilés, C., & Parés Franquero, Ò. (2017). Regulating Cannabis Social Clubs: A comparative analysis of legal and self-regulatory practices in Spain, Belgium and Uruguay. *International Journal of Drug Policy*, 43, 44-56. doi:10.1016/j.drugpo.2016.12.020
- ii. Decorte, T. (2010). The case for small-scale domestic cannabis cultivation. *International Journal of Drug Policy*, 21(4), 271-275. doi:<https://doi.org/10.1016/j.drugpo.2010.01.009>

2. Regulatory issues case studies

a. Regulatory overview & Challenges-

- i. Subritzky, T., Pettigrew, S., & Lenton, S. (2016). Issues in the implementation and evolution of the commercial recreational cannabis market in Colorado. *International Journal of Drug Policy*, 27, 1-12. doi:<https://doi.org/10.1016/j.drugpo.2015.12.001>

b. Role of Consultancies- Maybe two guest lectures

3. Legal issues case studies

a. Banking issues & solutions-

- i. SHU-ACQUAYE, F. (2016). THE UNINTENDED CONSEQUENCE TO LEGALIZING MARIJUANA USE: THE BANKING CONUNDRUM. *Cleveland State Law Review*, 64(2), 315-328.
- ii. Tighe, P. A. (2016). Underbanked: Cooperative banking as a potential solution to the marijuana-banking problem. *Michigan Law Review*, 114(5), 803-832.

4. Ethical issues case studies

a. Cannabis consumption- (Societal concerns on juvenile and child consumption)

b. Cannabis research- (Researchers from Hyacinth Biotech etc.)

5. Health & Safety case studies

a. Health concerns- (Researches on Long term effects of Cannabis)

b. Safety concerns- (Physical, Chemical and Microbiological hazards & Pesticides)

- i. Feldman, J. (2018). Pesticide Use in Marijuana Production: Safety Issues and Sustainable Options. [online] *Marijuana.heraldtribune.com*. Available at: <http://marijuana.heraldtribune.com/files/2015/03/Pesticide-Use-in-Marijuana-Production.pdf>.

REPOSITORY OF POTENTIAL GUEST LECTURERS

Example of potential speakers are listed in the sequence of lecture topics.

Cannabis Industry-

1. Rudy Jones Coordinator (613-727-4723, Ext. 6445; jonesr1@algonquincollege.com) is the coordinator of the biotechnology program at Algonquin College: (<http://www.algonquincollege.com/sat/program/biotechnology-advanced/contact/>) .Some of his graduates are working in the Cannabis industry
2. The grower in Smith Falls, Ontario is called Canopy Growth Corporation, see <https://www.canopygrowth.com/>.
3. Tom Shipley, VP quality assurance & regulatory affairs (<https://www.canopygrowth.com/about/leadership-team/>); <https://www.canopygrowth.com/international-footprint/vert-cannabis/>.
4. Hydropothecary <https://www.thehydropothecary.com/> and Hyacinth Bio <https://hyasynthbio.com/>
5. **Cannabis Retail-** Mr. Jason McLinton, Retail Council of Canada (LinkedIn- <https://www.linkedin.com/in/jason-mclinton-9187536b/>)

Regulatory-

1. **Regulatory Overview-** Ms. Karen Proper, NSF International (LinkedIn- <https://www.linkedin.com/in/karen-proper-453a6233/>) – speaker on cannabis regulations at SIAL 2018 in Montreal
2. **Regulatory Consultancies-** Ms. Sharan Sidhu (LinkedIn- <https://www.linkedin.com/in/sharan-sidhu-559a7b11/>) and Mr. Todd Sprieszl (LinkedIn- <https://www.linkedin.com/in/todd-sprieszl-03586015a/>) , Innovate Phytoceuticals. They write blogs about cannabis regulations.

Other resources:

Cannabis Growers of Canada <https://cannagrowers.ca/>

Canadian Government list of Licensed Producers <https://www.canada.ca/en/health-canada/services/drugs-health-products/medical-use-marijuana/licensed-producers/authorized-licensed-producers-medical-purposes.html>

MyCourses

Important communications with regards to the course will be made during lectures (and will be added in the “News” on MyCourses when possible). Lectures will be delivered via PowerPoint and other media, and the lecture slides will be posted on MyCourses.

When appropriate, questions should be posted in the “Discussion” section of MyCourses. The instructor and the teaching assistants will make their best to answer in a timely manner.

Polling @ McGill

Polling @ McGill (<http://www.mcgill.ca/polling/>) will be used in this course to enhance engagement, to increase interactivity and for grading (as a tool to record participation). During a class with polling questions, you will be able to respond from your personal device (smartphone, tablet, or laptop). Your responses using the Polling @ McGill service will be used as a tool to record participation so each student has to procure his own personal device.

Academic Policies:

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information).

L'université McGill attache une haute importance à l'honnêteté académique. Il incombe par conséquent à tous les étudiants de comprendre ce que l'on entend par tricherie, plagiat et autres infractions académiques, ainsi que les conséquences que peuvent avoir de telles actions, selon le Code de conduite de l'étudiant et des procédures disciplinaires (pour de plus amples renseignements, veuillez consulter le site (www.mcgill.ca/students/srr/honest/)).

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

McGill advises instructors to put a copyright symbol on their materials and remind students that those materials are protected by law, and that infringement of copyright will likely lead to disciplinary procedures under the Code of Student Conduct and Disciplinary Procedures (http://www.mcgill.ca/files/integrity/Code_of_Student_Conduct.pdf).

If you have a disability, please contact the instructor to arrange a time to discuss your situation. It would be helpful if you contact the Office for Students with Disabilities at 514-398-6009 before you do this.

McGill University shall strive to be recognized as an environmentally safe and responsible institution, and as a model of environmentally responsible living (<http://www.mcgill.ca/secretariat/policies/health>).

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.



New Course Proposal Form

(2013)

1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/>
2. Teaching Department: <div style="border: 1px solid black; padding: 2px; width: 100%;">Plant Science</div>	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify) <div style="border: 1px solid black; padding: 2px; width: 100%;">Macdonald</div>	
3. Administering Faculty/Unit: <div style="border: 1px solid black; padding: 2px; width: 100%;">Agr Env Sciences</div>	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term: <div style="border: 1px solid black; padding: 2px; width: 100%;">Winter 2020</div>	
6. Responsible Instructor <div style="border: 1px solid black; padding: 2px; width: 100%;">To Be Determined</div>	7. Course Title (Limit 30 Characters) - required for all courses: <div style="border: 1px solid black; padding: 2px; width: 100%;">Commercial Cannabis Production</div>	
9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters): <small>Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.</small> <div style="border: 1px solid black; padding: 2px; width: 100%;">Commercial Cannabis Production</div>	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: <div style="border: 1px solid black; padding: 2px; width: 100%;">PLNT 471</div> Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)	
10. Credit Weight (or CEU's for non-credit CE courses): <div style="border: 1px solid black; padding: 2px; width: 100%;">4</div>	11. Rationale for new course <div style="border: 1px solid black; padding: 10px; min-height: 100px;"> <p>This course is the first of three relevant production courses that will be offered in the second semester. This course will cover methods of commercial cannabis production indoors such as in greenhouses and "plant factories" with controlled environments. This course would cover relevant topics on related to production to ensure that all students have acquired sufficient knowledge and skills in the production stage of the cannabis industry before they progress to their internship.</p> </div>	
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): <small>(N.B. Faculty of Medicine must append complete course outline)</small> <div style="border: 1px solid black; padding: 5px; min-height: 100px;"> <p>Botany of the cannabis plant. Climate control for production in controlled environment agriculture: management of temperature, humidity, light, air quality. Production methods and management of irrigation, fertilization, soil and substrates, pests. Propagation, growth, pruning, pinching, harvest, scheduling, processing, storage, quality control, optimal cultivation strategies.</p> </div>		
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes. <div style="border: 1px solid black; padding: 10px; min-height: 50px;"> </div>		

14. Schedule Types(s):
 (Enter all that apply – see course guidelines for a complete list.)
 (i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
A - Lectures	10		
L - Laboratories	10		
Total Hours per Week:			20
Total Number of Weeks:			4

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?
 Yes No
 The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)
 Specify course number(s) or name(s) of test(s):

FDSC 475, FDSC 476, FDSC 477, PLNT 470

If the student does not have a prerequisite should web registration be blocked?
 Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?
 Yes No

18. Corequisite(s) Course Number(s):
 Specify course number(s) and title(s):

PLNT 472 and PLNT 473

If the student does not register for the corequisite in the same term should web registration be blocked?
 Yes No

19. Restriction(s):

Enrolled in Diploma in Commercial Cannabis: Meeting Industry Standards

20. Consultation Reports Attached
 Yes N/A

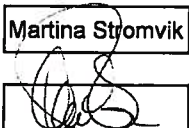

21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee (e.g. screening fee)	Amount

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)
 Yes No

INFORMATION FOR ENROLMENT SERVICES		
<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit : <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	Martina Stromvik			M.E. Scott		
Signature						
Date	Jan.29,2019			2019-01-07		
Departmental Contact Person (name/phone/email)	suha.jabaji/398-7561/suha.jabaji@mcgill.ca					

**Macdonald Campus of McGill University
Faculty of Agricultural and Environmental Sciences**

**Commercial Cannabis Production
(PLNT 471, 4 credits)**

Course description

Botany of the cannabis plant. Climate control for production in controlled environment agriculture: management of temperature, humidity, light, air quality. Production methods and management of irrigation, fertilization, soil and substrates, pests. Propagation, growth, pruning, pinching, harvest, scheduling, processing, storage, quality control, optimal cultivation strategies.

Rationale:

This course is the first of three relevant production courses which will be offered in the second semester. This course will cover methods of commercial indoor cannabis production such as in greenhouses and "plant factories" with controlled environments. This course would cover relevant topics on related to production to ensure that all students have acquired sufficient knowledge and skills in the production stage of the cannabis industry before they progress to their internship. No other course currently offered at McGill specifically deals with commercial-scale cannabis production.

Goals:

After completion of this course, students should be able to apply knowledge of the cannabis production industry to solve all aspects of production problems and give advice and recommendations.

Course weight: 4 credits course, 10 hours lecture and 10 hours lab per week for 4 weeks

Prerequisite: FDSC 475, FDSC 476, FDSC 477, PLNT 470

Instructor:

Office:

Tel.:

E-mail:

Teaching assistant:

Textbooks: TBD

Schedule: TBD

Evaluation:	Midterm exam	20%
	Final exam	35%

Lab Report	25%
Assignment(s)	20%

Please note that in the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change. In accordance with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded.

Teaching methods: This course uses a combination of lectures, practical projects, independent readings, and field trips. These methods require *active participation* on your part during labs and lectures as well as outside of class. "MyCourses" (<http://www.mcgill.ca/lms>) is used in this course as an additional resource for learning.

Theory pertaining to Cannabis will be covered in lectures. On-site labs in Plant Science will use Hops (*Humulus lupulus*) as model plant to conduct basic experiments such propagation, fertigation and climate control. Hops has similar botanical, molecular and structural characteristics as Cannabis and both belong to the Cannabinaceae order. These will be supplemented by scheduled visit to LP producers of cannabis.

Course topics (tentative)

1. **Introduction:** history and overview of cannabis production
2. **The botany of cannabis:** anatomy and physiology
3. **Growing systems, equipment and climate control:**
 - Temperature: heating, cooling and ventilation
 - Humidity
 - Light: managing quality, intensity and photoperiod
 - Air quality: CO₂, air pollutants, odor control
4. **Cultural practices:**
 - Soils and substrates
 - Irrigation: methods, scheduling, water quality
 - Fertilization
 - Propagation
 - Production techniques
 - Pinching and pruning
 - Crop scheduling and planning
 - Harvesting, post-harvest handling and processing
 - Control of pests: physical, chemical and biological methods (note: disease control is

covered in PLNT 473).

- Good Agricultural Practices (GAP), Hazard analysis and critical control points (HACCP) and quality control

Labs/Assignments

Labs

1. Cannabis cutting Propagation and tissue culture
2. Fertigation and nutrient management
3. Climate control

Assignments

Two Assignments on Field trips (2) to Cannabis growers using different growth platforms; conventional production and aquaculture production

Sources of information:

Here is a partial list of useful sources available in the Macdonald Campus Library. Also contact the librarians for more resources: <http://www.mcgill.ca/library/>.

1. Books:

Clarke, R.C. and M. D. Merlin. 2013. Cannabis: evolution and ethnobotany. University of California Press.

Jones, J.B. 2005. Hydroponics: a practical guide for the soilless grower, 2nd ed. CRC Press, U.S.A.

Nelson, P. V. 2012. Greenhouse operation and management, 7th ed. Prentice-Hall Inc., USA.

*Raviv. M. and J.H. Lieth. 2008. Soilless culture: theory and practice. Elsevier Science, Netherlands.

Sonneveld, C. and W. Voogt. 2009. Plant nutrition of greenhouse crops. Springer, Germany.

Upton, R. *et al.* 2014. Cannabis inflorescence: cannabis spp.; standards of identity, analysis, and quality control. American Herbal Pharmacopoeia, USA.

Van Straten, G., G. Van Willigenburg, E. Van Henten and R. Van Ooteghem. 2011. Optimal control of greenhouse cultivation. CRC Press, USA.

**e-books, available through the McGill library web site.*

2. « Trade » journals and industry magazines : recent information on events and new technologies

Cannabis Industry Journal: <https://www.cannabisindustryjournal.com/>

Greenhouse Canada <https://www.greenhousecanada.com/>

3. **Web sites:** see "MyCourses".

INFORMATION

Students with disabilities: as the instructor of this course we endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with us and the Office for Students with Disabilities at www.mcgill.ca/osd or 514-398-6009. Students already registered with OSD do need to contact them, using the web form, to make arrangements for accommodations for any assessments (midterms, lab exams, in-class essays/finals) that fall outside the official final examination period.

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Plagiarism is the intentional copying, paraphrasing or other use of another person's work or ideas without acknowledgement. Plagiarism can be from any source including books, magazines, newspapers, the Internet or another student's work.

Sickness/illness during the term: Please visit Student Services (CC1-124) at Macdonald Campus if you are suffering from any mental or physical health-related issues during the term. If you need to seek accommodation for in-course assignments, for medical or other emergencies, please bring medical documentation to the Student Affairs Office (106 Laird Hall). Details about this procedure are presented here: <http://www.mcgill.ca/macdonald/studentinfo/medical-notes>

Copy-right: instructor-generated course materials (e.g., handouts, notes, summaries, exam questions, etc.) are protected by law and may not be copied or distributed in any form or in any medium without explicit permission of the instructor. Note that infringements of copyright can be subject to follow up by the University under the Code of Student Conduct and Disciplinary Procedures.

Macdonald Campus Greenhouses:

The Raymond Greenhouse is normally open Monday-Friday from about 8:30 a.m. to 5:00 p.m.

1. Leave your coats, bags, cell phones and backpacks outside the greenhouse; there are coat hooks provided.
2. Wipe your shoes in in the mat with disinfectant solution in the entrance to the greenhouse.
3. Do not eat or drink in the greenhouse.
4. Wash your hands with soap and water before you start handling plant material.
5. Everyone must clean up (benches, floors, tools, pots, etc.) after working in the greenhouse. Brushes, dust pans, brooms, composting bins and sinks are available for this purpose.
6. Any large amounts of left-over potting media should be labelled and left in a container in a neat pile for future use. Small amounts should be disposed of in the appropriate garbage cans.
7. Complete labelling of all your plants is essential. Include your name, the date, and the treatment. Use your water-proof pen ("Sharpie").
8. If you notice bran or vermiculite or little paper bags on plants, do not remove them. These are used for the dispersal of biological control agents (insects or mites).
9. If you notice any insects or disease on greenhouse plants or any problems with the heating or ventilation systems, please notify the greenhouse technician immediately: leave a message on the white board outside the office.
10. Please get permission from greenhouse staff before taking any cuttings from greenhouse plants. Most are not available for taking cuttings.
11. After using the watering hoses, please carefully hang them on the hooks provided in each greenhouse section.
12. After using any equipment, containers or fertilizers, return them to their shelf or cabinet.
13. The greenhouse can only be used for courses and research. No personal projects are allowed.
14. If you are uncertain about greenhouse procedures, just ask the greenhouse technician or your teacher.



New Course Proposal Form

(2013)

1. Will this new course affect a current program?
If "yes", has a Program Revision Form been submitted concurrently? Yes No
Yes No

2. Teaching Department:

3. Administering Faculty/Unit:

6. Responsible Instructor:

4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify)

5. Effective Term of Implementation (Ex. Sept. 2004 = 200409)

Term:

7. Course Title (Limit 30 Characters) - required for all courses:

9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters):
Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.

10. Credit Weight (or CEU's for non-credit CE courses):

8. Course Number(s) indicate course number & the number of terms spanned: (tick all that apply)

Subject/course number:

Course(s) Span:

- 1 term
- 2 consecutive terms (D1, D2)
- 2 non-consecutive terms (N1, N2)
- 3 consecutive terms (J1, J2, J3)

11. Rationale for new course

The Cannabis industry is currently one of the fastest growing industries in Canada and the world. Given the changing legal status of the plant, and the rapidly advancing research, updated information on the advancement of Cannabis genomics and breeding is urgently needed. Insights on modern, high-throughput genomic technology are providing new tools to further improve our knowledge and utilization of this unique species. This course will allow students in the Diploma on Medicinal Cannabis to move into the Cannabis industry with the critical understanding of state-of-the-art approaches to genetic manipulation of the Cannabis plant.

12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline)

Knowledge on Cannabis genetic structure and available genomic resources for Cannabis research. Introduction to high throughput genomic technologies for the improvement of Cannabis cultivars and hybrids and tissue culture protocols. Origin and taxonomic classification of the cannabis genus. Principles and practices of Cannabis breeding, including the importance of QTL maps and methods of selection of important genetic traits.

13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes.

14. Schedule Types(s):

(Enter all that apply – see course guidelines for a complete list.)
(i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
A - Lectures	10		
L - Laboratories	10		
Total Hours per Week:			20
Total Number of Weeks:			4

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?

Yes No

The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)

Specify course number(s) or name(s) of test(s):

FDSC 475, FDSC 476, FDSC 477, PLNT 470

If the student does not have a prerequisite should web registration be blocked?

Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?

Yes No

18. Corequisite(s) Course Number(s):

Specify course number(s) and title(s):

PLNT 471 and PLNT 473

If the student does not register for the corequisite in the same term should web registration be blocked?

Yes No

19. Restriction(s):

Enrolled in Diploma in Commercial Cannabis: Meeting Industry Standards

20. Consultation Reports Attached

Yes N/A

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)

Yes No

21. Additional Course Charges (must be approved by the Fee Policy Committee)

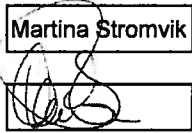
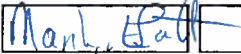
Description of Fee
(e.g. screening fee)

Amount

--	--

INFORMATION FOR ENROLMENT SERVICES		
<p><i>To be completed by the Faculty</i></p> <p>Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><i>To be completed by ES</i></p> <p>CIP Code</p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	<p><i>For Continuing Studies Use</i></p> <p>CS Admin. Unit : <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px;"></div></p> <p>Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A</p>

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	Martina Stromvik			M.E. Scott		
Signature						
Date	Jan.29,2019			2019-01-07		
Departmental Contact Person (name/phone/email)	Suha Jabaji/398-7561/suha.jabaji@mcgill.ca					

McGILL UNIVERSITY, MACDONALD CAMPUS - DEPARTMENT OF PLANT SCIENCE

GENERAL INFORMATION

Cannabis Genetics and Breeding (PLNT 472, 4 credits)

Course Description

Knowledge on Cannabis genetic structure and available genomic resources for Cannabis research. Introduction to high throughput genomic technologies for the improvement of Cannabis cultivars and hybrids and tissue culture protocols. Origin and taxonomic classification of the cannabis genus. Principles and practices of Cannabis breeding, including the importance of QTL maps and methods of selection of important genetic traits.

Course positioning

Cannabis is phenotypically and genetically diverse genus that has yet to benefit from advanced level of breeding applied to other commercial crops. In layman's terms, Cannabis strains are hybrid "mutts" when compared to other careful cultivated products with clear genetic history such as strawberries or apples. Cannabis strains have mixed up genetics and lineages that do not always match what is advertised leading to variation in cannabis properties that translates into different effects. Thus, Cannabis strains do not live up to their billing. With legalization on the near horizon, large Cannabis companies are turning attention to careful breeding of Cannabis for particular traits. Standardization Cannabis strains and protecting their genetic purity becomes a necessity as it could be incredibly useful for determining medical uses of the drug.

Course Rationale:

The Cannabis industry is currently one of the fastest growing industries in Canada and the world. Given the changing legal status of the plant, and the rapidly advancing research, updated information on the advancement of Cannabis genomics and breeding is urgently needed. Insights on modern, high-throughput genomic technology are providing new tools to further improve our knowledge and utilization of this unique species. This course will allow students in the Diploma on Medicinal Cannabis to move into the Cannabis industry with the critical understanding of state-of-the-art approaches to genetic manipulation of the Cannabis plant.

Achievable goals and deliverables:

After the completion of this course, students would be able to understand the complexity of Cannabis genetics and the importance of different approaches to develop a true Cannabis variety. They will also gain experience in tissue culture and molecular biology techniques, two acquired expertise that Cannabis industries are seeking in students.

Course Weight: 4 credits course, 10 hours lecture and 10 hours lab per week for 4 weeks

Prerequisite: FDSC 475, FDSC 476, FDSC 477, PLNT 470

Instructor: XXXX: Office: XXXX Tel.: XXXXX, E-mail: XXXXX

Assessment strategy and grading scheme:

Students will be assessed by the following modes:

For lectures:

Short Quizzes	(10%)
Mid-term	(25%)
Final exam	(35%)

For Lab:

Lab reports /short assignments	(20%)
Practical final exam	(10%)

COURSE LECTURE OUTLINE

PART 1 Introduction

- Introduction to principles of plant genetics
- History, phylogeny and phylogeography of *Cannabis*
- Characteristics of the most commonly used Cannabis species: *C. sativa*, *C. indica*, *C. ruderalis*
- Overview of the Cannabis strain market, seed banks, importance of seeds, hybrids and non-hybrid clones

PART 2 Genomic tools for Cannabis

- Available genome assemblies, Cannabis genomic data sets and future directions
- Cannabis organellar genomes and their importance in phylogeny
- Molecular-based approaches for the identification of functional genes behind important cannabis traits
- High-throughput sequencing methods *i.e.* genotyping by sequencing (GBS) whole genome shotgun (WGS)

PART 3 Principles of breeding

- Basic definitions of terms
- Common vs. genomic classification
- Comparison between hemp and marijuana types
- Importance of gene banks for storing and using genetic diversity present in wild material and among lineages of Cannabis
- Quantitative trait locus (QTL) and genome wide association studies
- Genetics maps and markers

Part 4

Breeding methods

- Classical Breeding
- Front-end and the back-end of plant breeding
- Discussion on ownership of biodiversity and the effects of international legislation about ownership
- Advantages and limitations of plant breeding selection programmes
- Appropriate selection method to breed for certain combinations of traits
- Analyse observations to separate genetic and non-genetic components of variation

LAB OUTLINE

On-site labs and growth chambers will use hops to conduct experiments dealing with tissue culture and molecular biology techniques. These will be supplemented by scheduled visits to LP producers specializing in propagation of Cannabis by tissue culture. Hops (*Humulus lupulus*) has similar botanical, molecular and structural characteristics to Cannabis. Both genera belong to the Cannabaceae family.

Lab 1.	Visualization of Cannabis structures and reproductive organs
Lab 2.	Identification phenotypic differences caused by genetic determinants
Labs. 3-4	Segregation analysis of a trait by observing the segregation population of a cross over several generation
Lab. 5-7	Marker-assisted selection. Application of molecular markers as an important tool to make breeding programs more efficient
Labs. 8-9	Cannabis tissue propagation for true strain preservation

Reading Material

Journals and Reviews

- Veragara D. et al. 2016. Genetics and genomic tools for Cannabis Sativa. Critical Reviews in Plant Science 35:364-377.
- Andre, C.M. et al., 2016. *Cannabis Sativa*: The Plant Thousand and One Molecule. Frontiers in Plant Science 7:19.
- Sawler J. Et al., 2015. The genetic structure of Marijuana and hemp. PLOS One 10(108):e01333292.

Books

- Green , G. 2005. The Cannabis Breeder's Bible. Green Candy Press. San Francisco, USA. 237 pages
- Small, E. 2017. Cannabis: A Complete Guide. CRC Press, NewYork. 567pages.

INFORMATION

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1. Will this new course affect a current program? If "yes", has a Program Revision Form been submitted concurrently? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 	
2. Teaching Department: <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">Plant Science</div>	4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other -- specify) <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">Macdonald</div>
3. Administering Faculty/Unit: <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">Agr Env Sciences</div>	5. Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term: <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">Winter 2020</div>
6. Responsible Instructor <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">To be determined</div>	
7. Course Title (Limit 30 Characters) - required for all courses: <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">Control of Cannabis Diseases</div>	8. Course Number(s) Indicate course number & the number of terms spanned: (tick all that apply) Subject/course number: <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">PLNT 473</div> Course(s) Span: <input checked="" type="checkbox"/> 1 term <input type="checkbox"/> 2 consecutive terms (D1, D2) <input type="checkbox"/> 2 non-consecutive terms (N1, N2) <input type="checkbox"/> 3 consecutive terms (J1, J2, J3)
9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters): Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above. <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto;">Control of Cannabis Diseases</div>	
10. Credit Weight (or CEU's for non-credit CE courses): <div style="border: 1px solid black; padding: 2px; width: 80%; margin: 5px auto; text-align: center;">4</div>	
11. Rationale for new course <div style="border: 1px solid black; padding: 5px;"> <p>The resurgence of interest in medicinal and non-medicinal uses of Cannabis underlines the need for an authoritative and comprehensive course on Cannabis diseases. Medical cannabis and recreational cannabis grown for commercial purposes are cultivated in greenhouses and other controlled environments utilizing intensive cultural practices. These plants are often impacted by nutrient deficiency, as well as by fungal and bacterial infections. The majority of LP producers have witnessed evidence of this problem firsthand. Plant yields and ultimate profitability can be severely undermined by pathogen infections. These pathogens are challenging to deal with, and early detection of fungus and pests eliminate these crop losses and boost overall yields. The content of this course will differentiate it from the existing course, plant pathology (PLNT 305) offered in the Faculty of Agricultural and Environmental Sciences. PLNT473 will cover in-depth the specific fungal, bacterial and insect diseases of Cannabis that are encountered under greenhouse settings; identification of the exact species of the pathogen(s) responsible for the evident Cannabis plant diseases, as well as secondary opportunistic infections. The course will cover current control methods in compliance with Health Canada including registered biopesticides and botanicals that are strictly recommended for use under the New Access to Cannabis For Medical Purposes Regulations (ACMPR).</p> </div>	
12. Course Description (as it will appear in the eCalendar [maximum 100 words]): (N.B. Faculty of Medicine must append complete course outline) <div style="border: 1px solid black; padding: 5px;"> <p>Knowledge on diseases and pest management of Cannabis grown under greenhouse and field settings. A systemic approach to pests and disease descriptions accompanied with an overview of biological, natural and management solutions to the pest and cannabis diseases. Details on products in compliance with health Canada with details on the products, and application methods are discussed. Practical laboratory sessions are designed so that students will gain experience in identifying various disease symptoms on Cannabis plants and are able to recommend a solution.</p> </div>	
13. Supplementary information to appear in the eCalendar in addition to the course description. Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc. Please enter the information as it should appear in the calendar notes. <div style="border: 1px solid black; height: 50px; width: 100%;"></div>	

14. Schedule Types(s):

(Enter all that apply – see course guidelines for a complete list.)
(i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
A - Lectures	10		
L - Laboratories	10		
Total Hours per Week:			20
Total Number of Weeks:			4

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?

Yes No

The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)

Specify course number(s) or name(s) of test(s):

FDSC 475, FDSC 476, FDSC 477, PLNT 470

If the student does not have a prerequisite should web registration be blocked?

Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?

Yes No

18. Corequisite(s) Course Number(s):

Specify course number(s) and title(s):

PLNT 471 and PLNT 472

If the student does not register for the corequisite in the same term should web registration be blocked?

Yes No

19. Restriction(s):

Enrolled in Diploma in Commercial Cannabis: Meeting Industry Standards

20. Consultation Reports Attached

Yes N/A

21. Additional Course Charges (must be approved by the Fee Policy Committee)

Description of Fee
(e.g. screening fee)

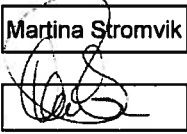

Amount

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)

Yes No

INFORMATION FOR ENROLMENT SERVICES		
To be completed by the Faculty Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No	To be completed by ES CIP Code <div style="border: 1px solid black; height: 20px; width: 100%;"></div>	For Continuing Studies Use CS Admin. Unit : <div style="border: 1px solid black; width: 100%; height: 20px;"></div> CS Non-Grant Courses: <div style="border: 1px solid black; width: 100%; height: 20px;"></div> Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	Martina Stromvik			M. E. Scott		
Signature						
Date	Jan. 29, 2019			2019-01-07		
Departmental Contact Person (name/phone/email)	Suha Jabaji/ 398-7561/suha.jabaji@mcgill.ca					

McGILL UNIVERSITY, MACDONALD CAMPUS - DEPARTMENT OF PLANT SCIENCE

GENERAL INFORMATION

Control of Cannabis Diseases (PLNT 473, 4 credits)

Course Rationale

The resurgence of interest in medicinal and non-medicinal uses of Cannabis underlines the need for an authoritative and comprehensive course on Cannabis diseases. Medical cannabis and recreational cannabis grown for commercial purposes are cultivated in greenhouses and other controlled environments utilizing intensive cultural practices. These plants are often impacted by nutrient deficiency, as well as by fungal and bacterial infections. The majority of LP producers have witnessed evidence of this problem firsthand. Plant yields and ultimate profitability can be severely undermined by pathogen infections. These pathogens are challenging to deal with, and early detection of fungus and pests eliminate these crop losses and boost overall yields. The content of this course will differentiate it from the existing course, plant pathology (PLNT 305) offered in the Faculty of Agricultural and Environmental Sciences. PLNT472 will cover in-depth the specific fungal, bacterial and insect diseases of Cannabis that are encountered under greenhouse settings; identification of the exact species of the pathogen(s) responsible for the evident Cannabis plant diseases, as well as secondary opportunistic infections. The course will cover current control methods in compliance with Health Canada including registered biopesticides and botanicals that are strictly recommended for use under the New Access to Cannabis For Medical Purposes Regulations (ACMPR).

Course Description:

Knowledge on diseases and pest management of Cannabis grown under greenhouse and field settings. Details on products in compliance with health Canada with details on the products, and application methods are discussed. Practical laboratory sessions are designed so that students will gain experience in identifying various disease symptoms on Cannabis plants and are able to recommend a solution.

Theory pertaining to Cannabis will be covered in lectures. On-site labs in Plant Science will use Hops (*Humulus lupulus*) as model plant to conduct basic experiments. Hops has similar botanical, molecular and structural characteristics as Cannabis and both belong to the Cannabinaceae order. These will be supplemented by scheduled visit to LP producers of cannabis.

Course Weight: 4 credits course, 10 hours lecture and 10 hours lab per week for 4 weeks

Instructor: XXXX: Office: XXXX Tel.: XXXXX, E-mail: XXXXX

Class Time: xxxx

Prerequisites: FDSC 475, FDSC 476, FDSC 477, PLNT 470

Assessment strategy and grading scheme:

Students will be assessed by the following modes:

Lectures:

Short Quizzes	(10%)
Mid-term	(25%)
Final exam	(35%)

Lab:

Lab reports /short assignments/field visits	(10%)
Practical final exam	(20%)

The content of every exam will correspond to information contained in the lectures, textbook and any assigned readings from other sources.

INFORMATION

Mobile, laptops and any other communication devices are not allowed in classes or lab periods unless it is specified by the instructor. **Please make sure that your cell phone is turned off!**

Make-up exams will not be given. If you miss the mid-term exam because of medical reasons (only), you require a doctor's certificate. The next exam will be worth 60%. Otherwise, the missed mid-term is worth zero.

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Cannabis Diseases and Control (PLNT 473) COURSE LECTURE OUTLINE

PART 1 INTRODUCTION

- Introduction to Principles of Plant Protection
- Relation between Growth factors and disease induction
- Taxonomy of organisms associated with Cannabis and symptoms of parasitic interaction

PART 2 DISEASES AND PESTS OF CANNABIS

- Insects and mites
- Fungal Diseases
- Other Cannabis Pests and Pathogens
- Abiotic Diseases
- Post-Harvest problems and contaminants

PART 3 DISEASE CONTROL AND MANAGEMENT

- Cultural and mechanical methods
- Biological control
- Use and abuse of organic pesticides

LAB OUTLINE

- | | |
|-----------|--|
| Lab 1. | Introduction to good lab procedures, Basic microscopy and use of compound, dissecting microscope with mounted camera |
| Lab 2. | Preparation and use of selective culture media to detect Cannabis pathogens |
| Labs. 3-4 | Identification of the different disease symptoms on plant tissues |
| Lab. 5-7 | Isolation, growth and identification of microbial structure of different pathogens |
| Labs. 8-9 | Methods of control- application of biological control agents and botanicals. |

Library consultation

Reading list

Required Book:

- MacPharland, JM, Clark, RC and Watson DP. 2002. Hemp Diseases and Pests: Management and Biological Control. CABI publishing, First Edition, New York. SBN-13: 978-0851994543

Recommended Reading:

- Agrios GN. 2005. Plant Pathology. Fifth Edition. Elsevier Academic Press. SBN-13: 978-8131206393; ISBN-10: 0120445654.
- Moore-Landacker, E. 1996. Fundamentals of the Fungi. Fourth edition. Benjamin-Cummings Publishing Company. Paper back, 592 pages. ISBN:0133768643



New Course Proposal Form

(2013)

1. Will this new course affect a current program?
If "yes", has a Program Revision Form been submitted concurrently? Yes No
Yes No

2. Teaching Department:

3. Administering Faculty/Unit:

6. Responsible Instructor

4. Campus (Downtown, Macdonald, Off Campus, Distance Ed, Other – specify)

5. Effective Term of Implementation (Ex. Sept. 2004 = 200409)

Term:

7. Course Title (Limit 30 Characters) - required for all courses:

9. Course Title to Appear in the eCalendar (optional) (Limit 59 characters):
Note: This can ONLY be an expansion of word(s) abbreviated in the 30 character course title above.

10. Credit Weight (or CEU's for non-credit CE courses):

8. Course Number(s)
Indicate course number & the number of terms spanned: (tick all that apply)

Subject/course number:

Course(s) Span:

1 term

2 consecutive terms (D1, D2)

2 non-consecutive terms (N1, N2)

3 consecutive terms (J1, J2, J3)

11. Rationale for new course

The course is designed to provide an hands-on experience in the Cannabis industry. Employers usually look for individuals who not only have a basic knowledge of the field, but who are motivated and independent and who have a variety of "soft" skills. In addition to the practical experience gained through working with a licensed producer, students will learn professionalism and ethics required at the workplace. They will witness first-hand the value of, and gain experience in, troubleshooting, multi-tasking and time-management as it relates to day-to-day activities in industry. They will also gain knowledge about the regulatory affairs surrounding the cannabis industry.

12. Course Description (as it will appear in the eCalendar [maximum 100 words]):
(N.B. Faculty of Medicine must append complete course outline)

A 12-week internship with a licensed cannabis producer. Workshops in advance of the placement will prepare students for the professionalism expected when working in industry and with controlled substances. Students will conduct a small project or prepare a research paper as part of their internship.

13. Supplementary information to appear in the eCalendar in addition to the course description.
Such as: equivalent course(s), contact hours, enrolment limitations, language of instruction etc.
Please enter the information as it should appear in the calendar notes.

Students must meet the industry requirements for doing an internship.

14. Schedule Types(s):

(Enter all that apply – see course guidelines for a complete list.)
(i.e. Lecture, Labs, Tutorial)

	Hours per Week	Hours per Week	Hours per Week
IN - Internship TOTAL HOURS	35		
Workshops	14hrs total		
Total Hours per Week:			35
Total Number of Weeks:			12 + 2 days

15. Projected Enrolment:

30

16. Required text and/or preliminary reading list sent to library?

Yes No

The library has been consulted about the availability of necessary resources? Yes No

17. Prerequisite(s) (Courses or Tests)

Specify course number(s) or name(s) of test(s):

FDSC 475, FDSC 475, FDSC 477, PLNT 470, PLNT 471, PLNT 472, PLNT 473

If the student does not have a prerequisite should web registration be blocked?

Yes No

If "Yes" complete A and B:

A. Indicate minimum grade or test score(s) the student must attain in prerequisite course(s) or test(s):

B

B. Can the prerequisite course(s) or test(s) be taken in the same term as this course?

Yes No

18. Corequisite(s) Course Number(s):

Specify course number(s) and title(s):

If the student does not register for the corequisite in the same term should web registration be blocked?

Yes No

19. Restriction(s):

Enrolled in Diploma in Commercial Cannabis: Meeting Industry Standards

20. Consultation Reports Attached

Yes N/A

22. Requires Teaching, Physical, or Financial Resources Not Currently Available (attach explanation)

Yes No

21. Additional Course Charges (must be approved by the Fee Policy Committee)


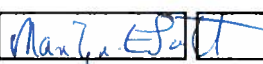
Description of Fee (e.g. screening fee)

Amount

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INFORMATION FOR ENROLMENT SERVICES		
To be completed by the Faculty Slot Course: <input type="checkbox"/> Yes <input type="checkbox"/> No Thesis Component: <input type="checkbox"/> Yes <input type="checkbox"/> No	To be completed by ES CIP Code <input style="width: 100%; height: 20px;" type="text"/>	For Continuing Studies Use CS Admin. Unit : <input style="width: 100%; height: 20px;" type="text"/> CS Non-Grant Courses: <input style="width: 100%; height: 20px;" type="text"/> Flat Rate: CdnFlat Rate: <input type="checkbox"/> Yes <input type="checkbox"/> N/A

23. Approvals:

Routing Sequence	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP
Name	Martina Stromvik			M. E. Scott		
Signature						
Date		Jan 29, 2019		2019-01-07		
Departmental Contact Person (name/phone/email)	Suha Jabaji/398-7561/suha.jabaji@mcgill.ca					

COURSE OUTLINE

CANNABIS INTERNSHIP

(PLNT 474, 6 CREDITS)

WINTER 2020

Instructor	TBD
Contact Information	TBD
TA	TBD
Contact Information	TBD
Course Pre-requisite(s)	PLNT 470, PLNT 471, PLNT 472, PLNT 473 FDSC 475, FDSC 476, FDSC 477

COURSE RATIONALE

The course is designed to provide hands-on experience in the Cannabis industry. Employers usually look for individuals who not only have a basic knowledge of the field, but who are motivated and independent and who have a variety of "soft" skills. In addition to the practical experience gained through working with a licensed producer, students will learn professionalism and ethics required at the workplace. They will witness first-hand the value of, and gain experience in, troubleshooting, multi-tasking and time-management as it relates to day-to-day activities in industry. They will also gain knowledge about the regulatory affairs surrounding the cannabis industry.

FORMAL COURSE DESCRIPTION

A 12-week internship with a licensed cannabis producer. Workshops in advance of the placement will prepare students for the professionalism expected when working in industry and with controlled substances. Students will conduct a small project or prepare a research paper as part of their internship.

COURSE STRUCTURE

Preparatory Workshops: All students are required to attend a one-day workshops. They will be well scheduled in advance of the internship so that placements can be confirmed. This will ensure that students have time to learn about their host industry and identify a small project or research paper that would be relevant for the host industry and provide a learning opportunity for the interns. Workshops will introduce the students to actual challenges in an industry and the tools they could use to find

solutions, and help them view their internship with a critical eye and attention to detail. Workshops will also include training on professional ethics in an industry setting with many proprietary concerns.

Internship: Students will be placed as an intern with a licensed cannabis producer for 12 weeks. They will have both an industry and an academic supervisor. Through prior arrangement with industries, it will be made clear that students are expected to undergo training around the facility allowing them to understand the nuances of a working industry while simultaneously assessing the needs and requirements of the industry. A transition from a theoretical background to a first (or new) professional role is best observed directly in industry.

Wrap-Up Workshop: A one-day workshop where students share their experiences with one another and industry representatives.

ASSESSMENT

Outline for Project or Research Paper	10%	Due 1 month before internship starts
Self-Statement of Learning Goals	5%	Due 1 week before internship begins
Mid-Term Evaluation of Performance by Industry	15%	Due after 6 th week of internship
Final Evaluation of Performance by Industry	20%	Due immediately after end of internship
Final Reflection on Learning Goals	10%	Due 2 weeks after end of internship
Project Report or Research Paper	40%	Due 1 month after end of internship

MORE DETAILED INFORMATION ON ASSESSMENTS

Outline of Project or Research Paper: In discussion with the industry and academic supervisors, students will select a topic and prepare an outline of how they will address this.

Mid-Internship Evaluation of Performance by Industry: This workplace evaluation will be completed by the employer but should be discussed with the student intern. The evaluation will be submitted to the academic supervisor.

Final Evaluation of Performance by Industry: This final workplace evaluation will be completed by the employer based on an overall evaluation of the student intern including information on the intern's attitude, knowledge and expectations. The evaluation will be submitted to the academic supervisor.

Project Report or Research Paper

Project Report: The project report should include a brief background and positioning statement, rationale and objectives, methodology, analysis, and deliverables. The project report will be evaluated by both the industry and academic supervisor.

Research Paper: Where it isn't feasible to conduct an actual project as part of the internship, students will select a topic for a research paper in collaboration with their industry and academic supervisors. The paper will explore concepts that might lead to new innovations for the cannabis industry.

Final Reflection on Learning Goals: Students will reflect on the internship experience and answer questions about the industry (eg. management structure, learning opportunities, strengths and weaknesses). They will be asked to relate their experience to the goals that they had set for themselves.

ADDITIONAL INFORMATION

The course outline will also include a list of relevant contacts, appendices with more detailed instructions and forms, and specific due dates.

McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information). (approved by Senate on 29 January 2003)

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded." (approved by Senate on 21 January 2009 - see also the section in this document on Assignments and evaluation.)

**Overview of 30 Credit Post-Baccalaureate Diploma
Commercial Cannabis: Meeting Industry Standards
January 2019**

1. Objective

McGill's Faculty of Agricultural and Environmental Sciences (FAES) envisions that this Cannabis post-baccalaureate Diploma will ensure that the rapidly expanding Canadian cannabis industry has access to highly qualified personnel trained to produce a safe, quality product in an environmentally sustainable manner to solidify Canada's position as an international leader in this field.

2. The Industry

The 2017 Canadian cannabis market was worth \$1.5B and is expected to have a market potential of \$7.4B¹. This projection is conservative when compared with Colorado's market trends. However, Canaccord estimates the value of the Canadian market to be around 10.4B\$².

In 2016, Canadian Agriculture GDP generated 111.9B\$ and employed 2.3 million people; therefore a potential and conservative GDP growth of 5.9B\$ from Cannabis could generate employment opportunities on a pro-rata basis for up to 120,000 people. Marijuana Business Daily reports that Canada could add 150,000 Cannabis jobs over the few next years, some with six-digit salaries³.

Unlike industries following a normal new product line life cycle where the slow increase in demand permits adjustments to market demand, the sudden legalization of recreational Cannabis will unleash substantial pent-up demand for products in both the recreational and medical sectors. This nascent multibillion dollar industry comprised of so many new corporations will require significant, immediate and ongoing support and training assistance as new sectors emerge. Such rapid market growth presents incredible opportunities for the educational, scientific, and labour sectors.

3. Impact of Legalization of Recreational Cannabis on the Commercial Cannabis Industry

In the newly Canadian regulated market, licensed producers for both recreational and medicinal

¹ Ackrell Capital's 2018 Cannabis Report

² Canaccord Genuity

³ Marijuana Business Daily

cannabis are required to follow the same regulatory compliance of Health Canada and to meet the same standards for laboratory testing for cannabinoid content, pesticides, and microbial and chemical contaminants. The explosive demand since legalization of recreational cannabis has created a huge unprecedented supply demand both for pre-existing licensed producers who are expanding their market to include the recreational sector, and for the many upcoming producers, most if not all of whom intend to target both markets.

4. Cannabis Programs Across Canada

From growing the perfect crop to development and marketing of a diversity of products and marketing within restrictive rules, Canadian post-secondary institutions⁴ are developing courses for those wanting to work in the booming Cannabis industry. Demand for this type of programming skyrocketed in advance of the legalization of recreational Cannabis, prompting technical colleges including Niagara College and Durham College in Ontario, Kwantlen Polytechnic University in BC and the New Brunswick Community College to offer classes on cultivation to keep up with demand for safe medicinal and recreational cannabis products (i.e., non-psychoactive cannabis products including beauty products and cannabis-infused edibles). The duration of these courses, all currently geared toward technicians, spans from a few days to a year. Statistics⁵ show that in the last six months, about 1,200 people aged 25-40 have taken Cannabis-related classes while working full-time in another industry.

Industry leaders consulted during program development, as well as participants in the Faculty's Spring and Summer Cannabis workshops who are involved with new start-ups or CEO's of new companies note that

- There is a lack of highly trained workers with specific knowledge of cannabis crops, product development and government regulations.
- There is a need for more rigorous training in Cannabis production and product development to comply with Health Canada regulations.
- There is a need for employees with strong critical thinking and problem-solving skills.
- There is a need for individuals whose strong transferable skills will allow them to adapt to the rapidly evolving industry.

Unfortunately the lag in University-level programming compared with that provided by Technical Colleges has created a significant void in the educational marketplace when it comes to such specialized and structured training. In response to this, in 2018, the FAES developed one-day workshops, one on Cannabis production and one on and extraction. Each of these workshops

⁴ [DailyHive](#), September

⁵ [Cannabis Stats Hub](#)

has been offered twice, and the number of acceptable applicants exceeded capacity by two-fold in all cases.

The proposed 30-credit Post-Baccalaureate Diploma Program “Commercial Cannabis: Meeting Industry Standards” will provide a high-level of training to students who already hold a BSc in agricultural, biological or environmental sciences.

5. FAES is Ideally Placed to Offer this Diploma

McGill, through the FAES, is ideally positioned to become the University leader in this area, not only in Canada but internationally, especially if we are able to be the first to offer advanced level University training.

At least three of the projected areas for industrial growth are captured through departments in FAES. The Department of Plant Science has expertise in large-scale horticultural practices including control of disease that minimizes use of pesticides, as well as methods of selective breeding to develop strains of Cannabis with increased cannabinoid (CBD) content and reproducible traits. The Department of Food Science and Agricultural Chemistry has expertise in biosynthesis of plant compounds, in monitoring quality and safety of products for human consumption, and of product development which is relevant, for example, to edible Cannabis products. Expertise in design of production facilities that minimize their environmental impact and landscape footprint will be sought from the Department of Bioresource Engineering once the Diploma becomes established. All three departments have ongoing collaborations with the Cannabis industry and are in discussion about expanding collaborations.

6. A Uniquely Cannabis-focused Diploma Is Necessary

With over 18,000 scientific publications on cannabis, training programs need to recognize the wealth of specialized information already available. Industry needs employees who are able to distill the rapidly exploding research on Cannabis so that they can critically assess which findings warrant follow-up and potential incorporation into industry practices or innovations.

The combination of psycho-active and medicinal compounds within Cannabis, together with the unknown nature of the germplasm, indicates that selective breeding for specific products is much more complex than for well-understood agricultural crops. In order to meet the needs of the industry, the program is designed to develop a thorough understanding of the cultivation of pharmaceutical-grade Cannabis and the processes and factors that influence product quality.

Furthermore, Cannabis cultivation takes place in a highly complex and evolving regulatory environment and requires more sophisticated and involved technical processes than traditional

crop production. Similarly, the production of cannabis products follows strict regulations pertaining to product development, packaging and labelling requirements. These regulations are essential to promote the safe handling and transportation of cannabis. Thus, graduates need to have an appreciation for the complexity of the regulatory aspects.

Finally, the use of Cannabis is steeped in ethical, legal and societal questions. Graduates will be expected to provide informed input into such discussions.

7. Potential Benefits for FAES and McGill

The major short-term benefits are establishing our position as the first Canadian University program of its kind, and expanding our base of partnerships with the Cannabis industry.

In the longer-term, this de-regulated Diploma will generate new revenue for FAES and for McGill. Our partnerships with licensed producers and with the range of Cannabis industries along the processing chain will provide outstanding opportunities for research and development, including opportunities for training graduate students.

8. Program Curriculum

The proposed Diploma contains specialized courses with offerings in all aspects of Cannabis production and product development and a 12-week unique industrial internship. This program will be “self-funded” and as such must follow specific directives from the Quebec Ministry of education and higher education. Specifically, courses for self-funded programs must be completely separate from courses available to students in our regular programs (2018-2019 document “Règles budgétaire et calcul des subventions de fonctionnement aux universités du Québec”, section 3.7; www.education.gouv.qc.ca). Therefore an entirely separate set of courses has been designed that will only be available to students taking this new Diploma.

The 30-credit program will include 8 required courses:

- three courses that address theoretical and practical aspects of Cannabis Production, each of which includes a substantive laboratory component and scheduled visits to licensed Cannabis industry
- three courses related to product safety and development
- one course focussed on ethical, legal and societal issues
- an internship placement with a licensed Cannabis industry

Current government regulations preclude us from growing cannabis for educational purposes. Until such time as licenses become available for this purpose, students will use Hops as a model plant for laboratory experiments. Hops (*Humulus lupulus*) has similar botanical, molecular and structural characteristics as Cannabis and both belong to the Cannabinaceae order. Students will

gain direct experience working with cannabis during scheduled visits to licensed producers, and during the 12-week internship with a licensed Cannabis industry.

9. Target Applicants and Admission Requirements

The Diploma is targeted for Canadians and permanent residents who have a B.Sc. in biological, agricultural or environmental sciences. Applicants should have 15 credits of plant-related courses, a course in biochemistry or organic chemistry and a minimum CGPA of 3.0 are expected, although relevant work experience will be considered. Applicants must meet industry requirements for the internship placement.

10. Rationale and Descriptions of Required Courses

FDSC 475 Introduction to Cannabis and Cannabinoids (3 credits; 3 hr lecture/wk)

Rationale: Medicinal cannabis production targets the optimization of cannabinoids that possess medicinal properties (such as CBDs) and minimization or elimination of cannabinoids with hallucinatory properties (such as THCs). A detailed chemical knowledge of the differences between the two types and their metabolic origin allows the students to develop a sound critical approach in their future investigations, to better understand the limitations of various analytical techniques in use, and to propose better solutions to the research problems encountered. This is a critical aspect for professionals entering the emerging Cannabis industry.

Description: The origin of the Cannabis plant. The chemistry, metabolic pathways of formation and biological activity and health benefits of phytochemicals in Cannabis plants. Extraction, classification, and analysis of bioactive components in Cannabis plants.

FDSC 476 Contaminants in Cannabis (3 credits; 3 hr lecture/wk)

Rationale: Contaminated cannabis products may pose food safety and public health risk and thus, it is important to study and understand the contaminants in cannabis. Knowledge on biology/chemistry, classification and testing of these contaminants will help trainees to identify them and knowledge of quality assurance procedures will help them in mitigating microbial, chemical and physical contaminants during production/processing of Cannabis and its products. This competence development would help in reducing the concerns over the food safety and public health due to contaminants in cannabis.

Description: Cannabis and its products are prone to contamination owing to improper handling and cross contamination during the production/processing. Cannabis may get

contaminated by various microbes viz. bacteria, fungi, viruses as well as parasites along with heavy metals and pesticides. This course will cover the basic concepts of various contaminants in cannabis viz. their sources, basic biology/chemistry, classification and testing of various contaminants, method validation and quality assurance procedures to avoid microbial/chemical contamination.

FDSC 477 Introduction to Cannabis Product Design and Development (3 credits; 3 hr lecture/wk)

Rationale: The cannabis industry needs to innovate to adapt traditional pharmaceutical practices in order to continue making scientific advancements and to normalize cannabis as a medicine or as nutraceutical/food products. A basic course on the development of Cannabis products where consistency and stability of the active cannabinoid is essential.

Description: This course provides the unique understanding of the fundamental principles needed to develop new food products from concept, to design, to production, as applied to Cannabis products.

PLNT 470 Cannabis Issues and Concerns (3 credits; 3 hr/wk lecture, discussion, presentations)

Rationale: With Canada's legalization of recreational cannabis and the growing interest in the field of cannabis, multiple frontiers are now open that challenge society and industry alike. This course is designed to prepare students for troubleshooting in professional environments dealing with cannabis. The assignments and presentations are strategically sequenced to allow students to slowly gain understanding of the real challenges in the Cannabis field. In continuation, this course would then better equip them during their internship semester in industry with hands on information on dealing with challenges in any of the sectors - Production, Cultivation, Research, Legal, Regulatory, Ethical, Health or Safety.

Description: Local, national and international perspectives on issues and concerns regarding Cannabis, with a focus on legal, regulatory, ethical and health and safety aspects relevant to Industry, Government, Academia and Consumers.

PLNT 471 Commercial Cannabis Production (4 credits; 10 hr lecture & 10 hr lab / wk for 4 wks)

Rationale: This course is the first of three relevant production courses of the Commercial Cannabis Production which will be offered in the second semester. This course will cover methods of commercial indoor cannabis production such as in greenhouses and "plant factories" with controlled environments. This course would cover relevant topics on related to production to ensure that all students have acquired sufficient knowledge and skills in the production stage of the cannabis industry before they progress to their

internship. No other course currently offered at McGill specifically deals with commercial-scale cannabis production.

Description: Botany of the cannabis plant. Climate control for production in controlled environment agriculture: management of temperature, humidity, light, air quality. Production methods and management of irrigation, fertilization, soil and substrates, pests. Propagation, growth, pruning, pinching, harvest, scheduling, processing, storage, quality control, optimal cultivation strategies.

PLNT 472 Cannabis Genetics and Breeding (4 credits; 10 hr lecture & 10 hr lab / wk for 4 wks)

Rationale: The Cannabis industry is currently one of the fastest growing industries in Canada and the world. Given the changing legal status of the plant, and the rapidly advancing research, updated information on the advancement of Cannabis genomics and breeding is urgently needed. Insights on modern, high-throughput genomic technology are providing new tools to further improve our knowledge and utilization of this unique species. This course will allow students in the Diploma on Commercial Cannabis to move into the Cannabis industry with the critical understanding of state-of-the-art approaches to genetic manipulation of the Cannabis plant.

Description: Knowledge on Cannabis genetic structure and available genomic resources for Cannabis research. Introduction to high throughput genomic technologies for the improvement of Cannabis cultivars and hybrids and tissue culture protocols. Origin and taxonomic classification of the cannabis genus. Principles and practices of Cannabis breeding, including the importance of QTL maps and methods of selection of important genetic traits.

PLNT 473 Control of Cannabis Diseases (4 credits; 10 hr lecture & 10 hr lab / wk for 4 wks)

Rationale: The resurgence of interest in medicinal and non-medicinal uses of Cannabis underlines the need for an authoritative and comprehensive course on Cannabis diseases. Medical cannabis and recreational cannabis grown for commercial purposes are cultivated in greenhouses and other controlled environments utilizing intensive cultural practices. These plants are often impacted by nutrient deficiency, as well as by fungal and bacterial infections. The majority of LP producers have witnessed evidence of this problem firsthand. Plant yields and ultimate profitability can be severely undermined by pathogen infections. These pathogens are challenging to deal with, and early detection of fungus and pests eliminate these crop losses and boost overall yields. The content of this course will differentiate it from the existing course, plant pathology (PLNT 305) offered in the Faculty of Agricultural and Environmental Sciences. PLNT472 will cover in-depth the specific fungal, bacterial and insect diseases of Cannabis that are encountered under

greenhouse settings; identification of the exact species of the pathogen(s) responsible for the evident Cannabis plant diseases, as well as secondary opportunistic infections. The course will cover current control methods in compliance with Health Canada including registered biopesticides and botanicals that are strictly recommended for use under the New Access to Cannabis For Medical Purposes Regulations (ACMPR).

Description: Knowledge on diseases and pest management of Cannabis grown under greenhouse and field settings. A systemic approach to pests and disease descriptions accompanied with an overview of biological, natural and management solutions to the pest and cannabis diseases. Details on products in compliance with health Canada with details on the products, and application methods are discussed. Practical laboratory sessions are designed so that students will gain experience in identifying various disease symptoms on Cannabis plants and are able to recommend a solution.

PLNT 474 Cannabis Internship (6 credits; 35 hr/wk for 12 wks in industry plus preparatory and follow-up activities)

Rationale: The internship is designed to provide students with an understanding of activities in the commercial cannabis industry and to conduct a project. The focus is to instill professionalism and ethics at workplace while simultaneously acquiring the skills of troubleshooting, multi-tasking and time-management. The students will also gain knowledge about the regulatory affairs surrounding cannabis. Employers usually look for individuals who are motivated and multi-tasked, independent, can work in teams, maintain client relations, have a basic knowledge of field and can prioritize. This internship aims to touch each of those soft skills through the series of internship components.

Description: The internship will ensure that students have a meaningful experience in the cannabis production industry during their Diploma, complemented with an initial design workshop that provides solution-based training on solving a problem statement, industrial training, an independent industry project, a seminar, and a group-based challenge whereby learning during the industrial internship would be applied to provide a solution to a problem statement.

11. Expected Knowledge and Unique Skills and Assets of Graduates

The curriculum has a strong focus on understanding and complying with the Access to Cannabis for Medical Purposes Regulations (ACMPR). Students will gain specialized skills and knowledge designed to meet the demand for a trained workforce in the commercial cannabis sector. Thus, the program will provide highly qualified, skilled, cannabis workforce-ready graduates.

Building on an undergraduate degree in a related field, graduates of this program will have:

- industry-specific knowledge ranging from the terminology and history of the industry to the regulatory framework;
- an understanding of the unique aspects of large-scale cannabis plant production;
- the ability to identify diseases in cannabis as well as manage disease in compliance with regulatory measures;
- an understanding of the genetics and molecular biology of cannabis and advances in cannabis genomics and strain profiling;
- knowledge about the medicinal chemistry of THC_s and of cannabinoids including approaches to extracting and analysing phytochemicals
- knowledge about the variety of contaminants that may be of health concern
- an understanding of the process of product design and development as it applies to pharmaceutical, nutraceutical and edible Cannabis products
- hands-on experience gained both through an extensive laboratory component and an industrial internship.

12. Logistical Dimensions

All aspects of the program are designed to ensure that there is no conflict of course scheduling, space, equipment or human resources with ongoing programs of FAES. Until such time as it becomes possible to obtain a license to grow cannabis for educational purposes, all cannabis plants and controlled products will be used only at facilities of licensed producers.

Scheduling: The four courses taken in the first semester (Winter) will be offered on evenings and weekends. This will optimize access to facilities on campus and guest speakers. It will also allow applicants who are currently employed access to the program. The three courses during the summer will be offered in one-month blocks. These courses require access to labs and greenhouses that would not be available during the Fall and Winter semesters. The internship course will be offered in the Fall semester.

Staffing: The program will have one full-time Faculty Lecturer who would be responsible for teaching up to 12 credits of courses. Initially, course lecturers will be hired to teach the remaining courses. This ensures that offering of this Diploma does not interfere with regular teaching responsibilities of existing professors. We intend to recruit new academic staff whose responsibilities would include teaching in this Diploma, and the number of course lecturers would be reduced, accordingly. Discussions are underway with the Library and other offices to ensure that students are able to receive support during outside regular hours during the Winter semester.

Financing: A full business plan has been developed and is being discussed by McGill's Planning Office. The full cost of the program would be covered by student fees together with contributions from industry. The working estimate of tuition for the Diploma is \$22,500. The budget includes the full costs for teaching staff, for equipment, materials and supplies needed for the laboratories, for a TA for all courses except the internship, for field trips, for guest speakers, and for administrative support. It includes scholarships for up to 5 Quebec students per year. It also includes overhead to McGill University and to FAES.

Industry Liaison: A key dimension of the long-term success of this program is ongoing liaison with the Cannabis industry. To this end, a consortium will be established between McGill University and several Industry partners. This will provide ongoing exchange, and will also be extremely helpful in ensuring internship placements for all students.



(2017)

<p>1.0 Degree Title Please specify the two degrees for concurrent degree programs</p> <p>Diploma</p>	<p>2.0 Administering Faculty/Unit</p> <p>Faculty of Agricultural and Environmental Sciences</p>
<p>1.1 Major (Legacy= Subject)(30-char. max.)</p> <p>Commercial Cannabis: Meeting Industry Standards</p>	<p>Offering Faculty/Department</p> <p>FAES / Plant Science; Food Science & Agri Chemistry</p>
<p>1.2 Concentration (Legacy = Concentration/Option) If applicable to Majors only (30 char. max.)</p> <p></p>	<p>3.0 Effective Term of Implementation (Ex. Sept. 2004 = 200409) Term</p> <p>Winter 2020</p>
<p>1.3 Minor (with Concentration, if Applicable) (30 char. max.)</p> <p></p>	

4.0 Rationale and Admission Requirements for New Proposal

The legalization of cannabis in Canada has resulted in enormous growth in the cannabis production industry, and a need for highly trained employees who are able to oversee the areas key to production and product development. Industrial consultation has confirmed that this meets their needs for highly trained personnel. All applicants must have a B.Sc in biological, agricultural or environmental sciences. 15 credits of plant-related courses, a course in biochemistry or organic chemistry and a minimum CGPA of 3.0 are expected; relevant work experience will be considered. Applicants must meet industry requirements for internship placement.

5.0 Program Information
Please check appropriate box(es)

<p>5.1 Program Type</p> <p><input type="checkbox"/> Bachelor's Program</p> <p><input type="checkbox"/> Master's</p> <p><input type="checkbox"/> M.Sc.(Applied) Program</p> <p><input type="checkbox"/> Dual Degree/Concurrent Program</p> <p><input type="checkbox"/> Certificate</p> <p><input checked="" type="checkbox"/> Diploma</p> <p><input type="checkbox"/> Graduate Certificate</p> <p><input type="checkbox"/> Graduate Diploma</p> <p><input type="checkbox"/> Ph.D. Program</p> <p><input type="checkbox"/> Doctorate Program (Other than Ph.D.)</p> <p><input checked="" type="checkbox"/> Self-Funded/Private Program</p> <p><input type="checkbox"/> Off-Campus Program</p> <p><input type="checkbox"/> Distance Education Program (By Correspondence)</p> <p><input type="checkbox"/> Other (Please specify)</p> <p></p>	<p>5.2 Category</p> <p><input type="checkbox"/> Faculty Program (FP)</p> <p><input type="checkbox"/> Major</p> <p><input type="checkbox"/> Joint Major</p> <p><input type="checkbox"/> Major Concentration (CON)</p> <p><input type="checkbox"/> Minor</p> <p><input type="checkbox"/> Minor Concentration (CON)</p> <p><input type="checkbox"/> Honours (HON)</p> <p><input type="checkbox"/> Joint Honours Component (HC)</p> <p><input checked="" type="checkbox"/> Internship/Co-op</p> <p><input type="checkbox"/> Thesis (T)</p> <p><input type="checkbox"/> Non-Thesis (N)</p> <p><input checked="" type="checkbox"/> Other</p> <p>Please specify</p> <p>Diploma</p>	<p>5.3 Level</p> <p><input checked="" type="checkbox"/> Undergraduate</p> <p><input type="checkbox"/> Dentistry/Law/Medicine</p> <p><input type="checkbox"/> Continuing Ed (Non-Credit)</p> <p><input type="checkbox"/> Collegial</p> <p><input type="checkbox"/> Masters & Grad Dips & Certs</p> <p><input type="checkbox"/> Doctorate</p> <p><input type="checkbox"/> Post-Graduate Medicine/Dentistry</p> <p><input type="checkbox"/> Graduate Qualifying</p> <p><input type="checkbox"/> Postdoctoral Fellows</p> <p>5.4 FQRSC (Research) Indicator (for GPS) Yes ___ No ___</p> <p>5.5 Requires Resources Yes <input checked="" type="checkbox"/> No ___</p>
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<p>6.0 Total Credits</p> <p>30</p>	<p>7.0 Consultation with Related Units Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Financial Consult Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Attach list of consultations.</p>
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8.0 Program Description (Maximum 150 words)

Graduates will have a critical understanding of ethical, medical, and legal issues related to the commercial cannabis industry, cannabis medicinal chemistry, contaminants, and product development, as well as theoretical and hands-on experience of production, breeding and disease management. The program will end with an internship where students will help the industry solve specific problems they are facing. This program will extend over 12 months.

9.0 List of proposed program for the New Program/Major or Minor/Concentration.


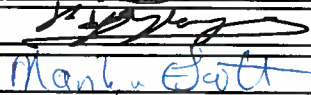
If new concentration (option) of existing Major/Minor (program), please attach a program layout (list of all courses) of existing Major/Minor.

Proposed program (list courses as follows: Subj Code/Crse Num, Title, Credit weight under the headings of: Required Courses, Complementary Courses, Elective Courses)

Required Courses (30 credits)

- PLNT 470 Cannabis Issues and Concerns (3)
- PLNT 471 Commercial Cannabis Production (4)
- PLNT 472 Cannabis Genetics and Breeding (4)
- PLNT 473 Control of Cannabis Diseases (4)
- PLNT 474 Cannabis Internship (6)
- FDSC 475 Introduction to Cannabis and Cannabinoids (3)
- FDSC 476 Contaminants of Cannabis (3)
- FDSC 477 Introduction to Cannabis Product Design and Development (3)

10.0 Approvals

Routing Sequence	Name	Signature	Date
Department	Department of Plant Science (Stromvik)		Jan 29, 2019
Dept. Curric/Acad Committee	Fd Sc + Agr. Chem (Yaglayan)		
Faculty 1 Curriculum Ctee Faculty 2 (FAES)	M.E. Scott	M.E. Scott	2019-01-07
Faculty 3			
CGPS			
SCTP			
APC			
Senate			

Submitted by

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Email: suha.jabaji@mcgill.ca

Submission Date: Jan 29, 2019

To be completed by ARR:

CIP Code: