

Course Title	: <i>Science and Creativity</i>
Course Code	: CLA9025
Recommended Study Year	: Any
No. of Credits/Term	: 3
Mode of Tuition	: Sectional
Class Contact Hours	: Two 1.5-hour sections per week
Category	: Creativity and Innovation
Prerequisite	: Nil
Co-requisite	: Nil
Exclusion	: Nil
Exemption Requirement	: Nil

Brief Course Description:

The fact that “scientist” regularly fails to appear on lists of “creative careers” is consistent with the common misconception that creativity is a special ability limited to artists, musicians, and writers, and that science is simply a dull list of accumulated facts and figures. In reality, evidence suggests that everyone has the ability to be creative and that creative ability can be improved. Moreover, many of the major advances in science occurred as the result of creative scientists developing new and innovative ways to view the world and solve problems. This course will introduce students to creativity and innovation, and the role they have played in the development of the scientific understanding of the natural world and ultimately to the state of the world itself. This course will use the process of science to study creativity and innovation by exploring theories and research on non-human animal innovation and creativity, and comparing and contrasting it with theory and research on human creativity.

Aims:

The aims of this course are (1) to explore the role of creativity in the development of science; (2) to use the process of science itself to explore the origins, factors, and characteristics that influence creativity; (3) to provide opportunities for students to apply creative thinking to learn about the natural world; and (4) to stimulate students to develop creative and innovative solutions to problems.

Learning Outcomes (LOs):

On completion of this course, students will be able to:

1. Define, recognize, and explore creativity.
2. Explain and analyze the role of abilities, mental functioning, personality characteristics, and environmental/historical conditions that promote creativity and how to promote creativity.
3. Analyze examples of the role of creativity and innovation in the solution of problems

across a number of scientific disciplines.

4. Explore theories and research on innovation and creativity in humans.
5. Explore theories and research on non-human animal innovation and creativity, comparing and contrasting with humans.
6. Apply creativity and the process of science to address real world issues.

Indicative Content:

- What is creativity? Who is creative? Can anyone be creative?
- The role of creativity and innovation in science
- Characteristics of creative scientists and conditions that favor or hinder creativity
- Cognitive basis of creativity
- Theories and research on creativity and innovation in non-human animals
- Theories and research on creativity in innovation in humans
- How to improve innovation and creativity skills?

Teaching Methods:

Students will meet twice each week for one and a half hours, including lectures, class activities, and discussions.

Measurement of Learning Outcomes:

Assessment Method	In- class/take home Assignments	Written Assignments
Define, recognize, and explore creativity	X	X
Explain and analyze the role of abilities, mental functioning, personality characteristics, and environmental/historical conditions that promote creativity and how to promote creativity.	X	X
Analyze examples of the role of creativity and innovation in the solution of problems across a number of scientific disciplines	X	X
Explore theories and research on innovation and creativity in humans	X	X
Explore theories and research on non-human animal innovation and creativity, comparing and contrasting with humans.	X	X
Apply creativity and the process of science to address real world issues.	X	X

Course Assessment:

Assignments (in class and take-home)	40%
Written assignments	60%

Recommended/Supplementary Readings:

(Instructor will assure material is appropriate for cluster course)

Books

Kaufman, A. B. and J. C. Kaufman (eds), *Animal Creativity and Innovation*, Elsevier Inc., 2015.

Sawyer, R. K., *Explaining Creativity: The Science of Human Innovation*, Oxford University Press, 2012.

Simonton, D.K., *Creativity in Science: Chance, Logic, and Zeitgeist*, Cambridge University Press, 2004.

Scholarly articles

Caruthers, P. 2002. Human creativity: it's cognitive basis, its evolution, and its connections with childhood pretense. P. Caruthers. *Brit J. Phil. Sci.* 53:225 – 249

Gregoire, J. 2018. Overcoming obstacles to creativity in science. *Estudios de Psicologia (Campinas)* 3(5) 229-236.

Khalil, R., B. Godde, and A. A. Karim. 2019. The link between creativity, cognition, and cognitive drives and underlying neural mechanisms. 2019. *Frontiers in Neural Circuits*. March 22, 2019.

Online

Where creativity comes from

<https://www.scientificamerican.com/article/where-creativity-comes-from/>

Creativity: the weird and wonderful art of animals

<https://www.bbc.com/future/article/20140723-are-we-the-only-creative-species>

Creativity on the wild side: animal innovation

<https://www.psychologytoday.com/us/blog/imagine/200807/creativity-the-wild-side-animal-innovation>

Videos

Science relies on creativity. TEDx. Graham Wright

<https://www.youtube.com/watch?v=L4xzleHqfJI>

The science of improving your brain's creativity. TEDx. Nick Skillicorn

<https://www.youtube.com/watch?v=y44GBM99JOA>

Important Notes:

- (1) Students are expected to spend a total of 9 hours (i.e. 3 hours of class contact and 6 hours of personal study) per week to achieve the course learning outcomes.
- (2) Students shall be aware of the University regulations about dishonest practice in course work, tests and examinations, and the possible consequences as stipulated in the Regulations Governing University Examinations. In particular, plagiarism, being a kind of dishonest practice, is “the presentation of another person’s work without proper acknowledgement of the source, including exact phrases, or summarised ideas, or even footnotes/citations, whether protected by copyright or not, as the student’s own work”. Students are required to strictly follow university regulations governing academic integrity and honesty.
- (3) Students are required to submit writing assignment(s) using Turnitin.
- (4) To enhance students’ understanding of plagiarism, a mini-course “Online Tutorial on Plagiarism Awareness” is available on <https://pla.ln.edu.hk/>.

Assessment Rubrics

Rubric for Writing Assignments

Criteria	Excellent (A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Poor (D+, D)	Fail (F)
<p>Organization and accuracy of content (70%)</p>	<p>Addresses the assignment fully, follows instructions completely.</p> <p>Demonstrated knowledge goes substantially beyond what is expected of students in this course.</p> <p>Ideas are clearly arranged to allow easy understanding of their relations.</p>	<p>Addresses the assignment fully and follows most of the instructions.</p> <p>Demonstrates knowledge of most important points; As excellent, but with slightly more mistakes in arrangement of ideas.</p>	<p>Addresses most of the assignment and follows most of the instructions.</p> <p>Demonstrates knowledge of most important point, and the most important points of disagreement, but with some lack of clarity or inaccuracy.</p> <p>Basic structure is good, but sometimes arrangement of ideas is confusing</p>	<p>Some of the basic points are understood, but the student shows substantial misunderstandings.</p> <p>Organization of the material could be greatly improved, with major factual inaccuracies; is difficult to follow due to unclear structure.</p>	<p>Fails to address the assignment or follow instructions.</p> <p>Student understanding deviates significantly from reality.</p> <p>Lack of organizational structure/largely incomplete.</p>
<p>Uses language effectively (30%)</p>	<p>Clear, engaging writing, with almost no mistakes in grammar or spelling.</p>	<p>Occasional mistakes in grammar or spelling which do not interfere with comprehension.</p>	<p>Substantial mistakes that sometimes make comprehension difficult.</p>	<p>Significant portions cannot be accurately assessed because of problems with the writing.</p>	<p>The content is difficult or impossible to evaluate</p>

In-class and Take-home Assignments

Some in-class and take-home assignments will be graded on a pass/fail completion basis. And some will be graded based on performance according to the answer key. Questions on these assignments (short answer, fill in the blank, draw a graph/diagram, multiple choice) will generally have right and wrong answers and the quizzes will be designed to assess learning mastery on the following scale. For special assignments, students will be given assignment-specific grading rubric for grading.

Criteria	Excellent (A, A-)	Good (B+, B, B-)	Fair (C+,C,C-)	Poor (D+, D)	Fail (F)
Level of mastery of material	Demonstrates excellent level of mastery of material	Demonstrates a good level of mastery of material	Demonstrates a satisfactory level of mastery of material	Demonstrates a minimal level of mastery of material	Fails to demonstrate satisfactory mastery of material