THE EDUCATION UNIVERSITY OF HONG KONG

Course Outline

Part I

Programme Title	**:**	Certificate in Professional Development Programme on STEAM in Physical Education 教師專業進修課程證書 (體育學與教之科學、科技、工程、藝術及數學範疇)
Programme QF Level	**:**	QF Level 6
Course Title	**:**	Learning and Teaching in PE with STEAM Approach 體育學與教之科學、科技、工程、藝術及數學範疇
Course Code	**:**	PES5298
Department	**:**	Health and Physical Education
Credit Points	**:**	3
Contact Hours	**:**	30 hours (lecture, workshop, lesson for analysis) + 9 hours (Blended learning)
Pre-requisite(s)	**:**	In-service Primary and Secondary School PE teachers
Medium of Instruction	**:**	Chinese
Course Level	**:**	5

Part II

The University's Graduate Attributes and seven Generic Intended Learning Outcomes (GILOs) represent the attributes of ideal EdUHK graduates and their expected qualities respectively. Learning outcomes work coherently at the University (GILOs), programme (Programme Intended Learning Outcomes) and course (Course Intended Learning Outcomes) levels to achieve the goal of nurturing students with important graduate attributes.

In gist, the Graduate Attributes for Sub-degree, Undergraduate, Taught Postgraduate, Professional Doctorate and Research Postgraduate students consist of the following three domains (i.e. in short "PEER & I"):

- **P**rofessional **E**xcellence;
- **E**thical **R**esponsibility; **&**
- **I**nnovation.

The descriptors under these three domains are different for the three groups of students in order to reflect the respective level of Graduate Attributes.

The seven GILOs are:

1. Problem Solving Skills
2. Critical Thinking Skills
3. Creative Thinking Skills

4a. Oral Communication Skills
4b. Written Communication Skills
5. Social Interaction Skills
6. Ethical Decision Making
7. Global Perspectives

1. Course Synopsis

The course aims to acquaint serving PE teachers with knowledge and skills in STEAM education to develop relevant curriculum and implementing effective and innovative pedagogies for strengthening the learning experiences for students' cognitive STEAM thinking skills, social, psychomotor as well as cultural learning for students at Key Stage 2, 3 and 4. A variety of learning methods are employed, such as problem-based learning (PBL), discovery learning, and exploratory learning. This program emphasizes science, technology, engineering, arts, and mathematics to cater to students with a diversity of needs and abilities. Students who actively participate in PE learning will learn about, apply, research and practice solutions for problems in schools. Within the course, innovative curricular and pedagogical models like blended learning, flipped learning strategies, problem-based learning strategies and so on will also be studied.

2. Course Intended Learning Outcomes ($CILO_s$)

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

$CILO_1$ demonstrate critical understanding of the rationales behind pedagogical and curricular innovation advancement with STEAM education in PE;

$CILO_2$ develop and test curricular plans for the application of STEAM with curricular and pedagogical models for cultivating students' creativity, collaboration skills, problem solving skills, critical thinking skills, computational skills, engineering design process skills, aesthetic sensitivity, social, psychomotor and cultural learning through PE and interdisciplinary collaboration;

$CILO_3$ appraise critically the feasibility of promoting and implementing various innovative models for teaching PE in Hong Kong.

3. Content, CILOs and Teaching & Learning Activities

Course Content	CILOs	Suggested Teaching & Learning Activities
Critical review on the rationales behind pedagogical and curricular advancement with STEAM education in PE	*$CILO_1$*	Lectures and group discussion
Development of relevant curriculum and its implementation of effective and innovative pedagogies in PE: ● Mosston's Spectrum of Teaching Styles in PE ● Inquiry-based learning ● Project-based learning ● Fitness and Health Education	*$CILO_{2,3}$*	Lecture, group discussion, practical workshop and curriculum planning

model ● Cooperative learning ● Problem-based learning ● Blended learning ● Flipped learning ● Apply Computational thinking into STEAM learning ● Engineering design process		

4. Assessment

Assessment Tasks	Weighting (%)	CILO
(a) Individual portfolio with not less than 1800 words comprising critical evaluation of rationales for respective programme designs, content development, planning for teaching, and the selection of teaching resources related to learning and teaching activities and safety precautions with STEAM approach.	60	$CILO_{1, 2}$
(b) A group presentation on the application of alternative curriculum and pedagogical models to design and develop a school-based PE curriculum with STEAM approach.	40	$CILO_{1, 3}$

5. Required Text(s)

Khine, M. S., & Areepattamannil, S. (Eds.). (2019). *STEAM Education: Theory and Practice*. Springer.

6. Recommended Readings

Capraro, M. M., Whitfield, J. G., Etchells, M. J., & Capraro, R. M. (editors). (2016). *A Companion to Interdisciplinary STEM Project-based Learning: For Educators by Educators* (2nd Ed.). Sense Publishers.

Casey, A., Goodyear, V. A., Armour, K. M., (editors). & ebrary, Inc. (2017). *Digital Technologies and Learning in Physical Education: Pedagogical cases.* Routledge.

Fletcher, T., Ovens, A., (editors). (2014). *Self-study in Physical Education Teacher Education: Exploring the Interplay of Practice and Scholarship*. Springer.

Gumilang, E. S., Martini, T., & Budiana, D. (2022). Self-regulated learning based-STEM model: How it impacts students' self-directed learning in physical education classes. *Journal Sport Area*, *7*(3), 465-472. https://doi.org/10.25299/sportarea.2022.vol7(3).10550

IGI Global, publisher. & Information Resources Management Association, (editor). (2015). *STEM Education: Concepts, Methodologies, Tools, and Applications.* IGI Global.

Lansiquot, R. D. (editor). (2016). *Technology, Theory, and Practice in Interdisciplinary STEM Programs: Connecting STEM and Non-STEM Approaches.* Palgrave Macmillan US. https://doi.org/10.1057/978-1-137-56739-0

Lee, H. S., & Lee, J. (2021). Applying artificial intelligence in physical education and future perspectives. *Sustainability (Basel, Switzerland), 13*(1), 1-16. https://doi.org/10.3390/su13010351

Li, C., Kevin Kam, W. K., & Zhang, M. (2019). Physical education teachers' behaviors and intentions of integrating STEM education in teaching. *The Physical Educator, 76*(4), 1086-1101. https://doi.org/10.18666/TPE-2019-V76-I4-9104

Li, N., & Xue, Y. (2022). Artificial intelligence-based assessment of physical education and training effectiveness. *Computer-Aided Design and Applications*, 75-84. https://doi.org/10.14733/cadaps.2023.S5.75-84

Li, Z., & Wang, H. (2021). The effectiveness of physical education teaching in college based on artificial intelligence methods. *Journal of Intelligent & Fuzzy Systems*, *40*(2), 3301-3311. https://doi.org/10.3233/JIFS-189370

Ponce, P., López-Orozco, C. F., Reyes, G. E. B., Lopez-Caudana, E., Parra, N. M., & Molina, A. (2022). Use of robotic platforms as a tool to support STEM and physical education in developed countries: A descriptive analysis. *Sensors (Basel, Switzerland)*, *22*(3), 1037-. https://doi.org/10.3390/s22031037

Rink, J. (2014). *Teaching Physical Education for Learning* (7th Ed.). McGraw-Hill.

Rovegno, I., & Bandhauer, D. (2017). *Elementary Physical Education: Curriculum and Instruction* (2nd Ed.). Jones & Bartlett Learning.

The Curriculum Development Council. (2014). *Basic Education Curriculum Guide – To sustain, deepen and focus on learning to learn (Primary 1 – 6)*. The Curriculum Development Council.

The Curriculum Development Council. (May 2017). *Secondary Education Curriculum Guide* (Draft). The Curriculum Development Council.

The Curriculum Development Council. (May 2017). *Physical Education Key Learning Area Curriculum Guide (Primary 1 – 6)*. (Draft). The Curriculum Development Council.

Thorburn, M. (2017). *Transformative learning and teaching in physical education.* Routledge.

Wajciechowski, M., & Hemphill, M. (2019). STEM and physical education: Making connections for our students, building strength for our profession. *Strategies (Reston, Va.), 32*(6), 43-45. https://doi.org/10.1080/08924562.2019.1658435

Wang, Y. (2021). Physical Education Teaching in Colleges and Universities Assisted by Virtual Reality Technology Based on Artificial Intelligence. *Mathematical Problems in Engineering, 2021*, 1-11. https://doi.org/10.1155/2021/5582716

Yang, D., Oh, E.-S., & Wang, Y. (2020). Hybrid physical education teaching and curriculum design based on a voice interactive artificial intelligence educational robot. *Sustainability (Basel, Switzerland), 12*(19), 1-14. https://doi.org/10.3390/su12198000

Yanru, L. (2021). An artificial intelligence and machine vision based evaluation of physical education teaching. *Journal of Intelligent & Fuzzy Systems, 40*(2), 3559-3569. https://doi.org/10.3233/JIFS-189392

Zhang, Y. A. (2015). *Handbook of Mobile Teaching and Learning*. Springer

甘偉強、李宗、高達倫、周佩瑜、潘凱琳、歐陽效章 (2014)：《競技運動教育模式在香港的研究與推展》，香港：香港教育學院健康與體育學系。

李宗、甘偉強、高達倫、周佩瑜、歐陽效章(2013)：《Mosston 教學光譜在香港的研究與推展》，香港：香港教育學院健康與體育系。

課程發展議會(2017)：《體育學習領域課程指引(小一至中六)》，香港：課程發展議會。

課程發展議會(2015)：《推動 STEM 教育—發揮創意潛能》，香港：課程發展議會。

課程發展議會與香港考試及評核局(2015)：《體育課程及評估指引(中四至中六)》(二零一五年十一月更新)，香港：課程發展議會。

7. Related Web Resources

Education Bureau Website
http://www.edb.gov.hk/

PE Summer School
http://www.ied.edu.hk/pesummerschool/

8. Related Journals

Physical Educator
Journal of Teaching in Physical Education

9. Academic Honesty

The University upholds the principles of honesty in all areas of academic work. We expect our students to carry out all academic activities honestly and in good faith. Please refer to the *Policy on Academic Honesty, Responsibility and Integrity* (https://www.eduhk.hk/re/uploads/docs/00000000001633679892454 8BbN5). Students should familiarize themselves with the Policy.

10. Others

Nil