



University
of Victoria

**Faculty of Education
School of Exercise Science, Physical and Health Education**

**Fall 2024
Motor Learning
EPHE 245/A01/11497**

Instructor: Dr. Olav E. Krigolson
Class Location: MCK 150
Class Times: Monday / Thursday 8:30am to 9:50am
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Web Sites: BrightSpace
<https://www.krigolsonteaching.com/ephe-245.html>

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Calendar Description

Neural and cognitive processes underlying human skilled action and the factors that influence learning and control of these actions. Ways in which the human motor system enables the acquisition and retention of complex movement skills and implications for the design of instructional situations to support retention and optimal performance of skilled actions.

The Relevance and Purpose of EPHE 245

How do we learn? What do we learn? How can we improve learning? The purpose of this course is simple – it is to provide answers to those three questions. I will let you decide the relevance of this course to your own life and future.

Learning Outcomes

At the end of this course, you will be able to:

1. Distinguish among the phenomena of motor control, motor performance, motor development, and motor learning.
2. Analyze motor tasks and be able to determine the main demands on the performer from these tasks.
3. Identify and describe the general role of the various neural processes and substrates that control motor learning and performance.
4. Compare the power of various theoretical approaches to explain the processes and outcomes of motor learning and control.
5. Analyze the capabilities and limitations of the human performer to learn and perform skilled actions.
6. Analyze the constraints on performance created by the context in which a motor skill is performed.

7. Analyze motor tasks demands in order to determine optimal practice conditions to facilitate the learning of these skilled motor actions.
8. Apply motor learning concepts and principles to design effective practice/relearning/rehabilitation environments.
9. Apply basic research and statistical principles in the examination of general motor learning and performance phenomena.
10. Write concise research reports that analyze and explain experimental data generated through laboratory examination of motor learning and performance phenomena.

These learning outcomes will be achieved through:

- Consistent participation in class discussion and activities,
- Thorough understanding of the course readings,
- Successful completion of formal and informal course assignments,
- Thorough preparation for course examinations.

Text/Reading List

See: <https://www.krigolsonteaching.com/ephe-245.html>

Course Format and Structure

This course is designed to answer three primary questions which reflect courses themes - How We Learn, What We Learn, and How Can We Improve Learning. Before we answer those questions, the first three topics will focus on basic background knowledge needed to study learning. After that, within each theme, we will approach the material at three difficulty levels – Introductory, Intermediate, and Advanced. Note, the course progresses through the difficulty levels as opposed to through the themes, see the Course Outline after this section for the progression.

Background	Theme	Introductory	Intermediate	Advanced
1. The Power Law of Learning	How We Learn	Repetition, Expertise, and Hebbian Learning	Synaptic Plasticity	LTP and LTD
		Feedback	Prediction Errors and Reinforcement Learning	Dopamine
2. Performance vs Learning and Retention vs Transfer	What We Learn	Motor Programs	Motor Representations	Internal Models
		Motor Schemas	Memory as Synaptic Strength	Forgetting
3. The Stages of Learning	How We Can Improve Learning	Distribution and Randomization	Deliberate Practice and Practice Specificity	Sleep
		Variability and Part Practice	Mental Imagery	Aging, Nutrition, and Other Factors
4. Procedural Memories				

EPHE 245: Course Overview

Thursday, September 5 th	1. Background One The Power Law of Learning
Monday, September 9 th	2. Background Two Performance vs Learning and Retention vs Transfer
Thursday, September 12 th	3. Background Three The Stages of Learning
Monday, September 16 th	4. Background Four Procedural Memories
Thursday, September 19 th	5. Introductory One Repetition, Expertise, and Hebbian Learning
Monday, September 23 rd	6. Introductory Two Feedback
Thursday, September 26 th	7. Introductory Three Motor Programs
Monday, September 30 th	No Class: National Day for Truth and Reconciliation
Thursday, October 3 rd	8. Introductory 4 Motor Schemas
Monday, October 7 th	9. Introductory 5 Distribution and Randomization
Thursday, October 10 th	10. Introductory 6 Variability and Part Practice
Friday, October 11 th	Midterm Exam One opens online October 11th, 10am to October 14th, 10am
Monday, October 14 th	No Class: Thanksgiving
Thursday, October 17 th	11. Intermediate 1 Synaptic Plasticity
Monday, October 21 st	12. Intermediate 2 Prediction Errors and Reinforcement Learning
Thursday, October 24 th	13. Intermediate 3 Motor Representations

Monday, October 28 th	14. Intermediate 4 Memory as Synaptic Strength
Thursday, October 31 st	15. Intermediate 5 Deliberate Practice and Practice Specificity
Monday, November 4 th	16. Intermediate 6 Mental Imagery
Tuesday, November 5 th	Midterm Exam Two opens online November 5th, 10am to November 8th, 10am
Thursday, November 7 th	17. Advanced 1 LTP and LTD
Monday, November 11 th	No Class: Reading Break
Thursday, November 14 th	18. Advanced 2 Dopamine
Monday, November 18 th	19. Advanced 3 Internal Models
Thursday, November 21 st	20. Advanced 4 Forgetting
Monday, November 25 th	21. Advanced 5 Sleep
Thursday, November 28 th	22. Advanced 6 Aging, Nutrition, and Other Factors
Friday, November 29 th	Midterm Exam Three opens online November 29th, 10am to December 2nd, 10am
Monday, December 2 nd	23. Exam Preparation (Optional)
December 7 th to 20 th	EPHE 245 Final Exam EPHE 245 Midterm Rewrites

The course instructor reserves the right to make and changes to this course outline and the course content at any time.

Assessment

Due Date	Activity	Details	Grade
Every Day	Quizzes	<p>Before every class, including the first, there will be a quiz worth 1 point.</p> <p>The quizzes will be available online for the 24 hours preceding the class. For example, for the Monday class starting at 8:30am the quiz will be available from 8:30am Sunday to 8:30am Monday. For the Thursday class the quiz will be open from 8:30am Wednesday until 8:30am on Thursday.</p> <p>There will be 22 quizzes in total worth 15% of your course grade. Only your 20 best scores will be counted. If you complete the “extra” quizzes, these will be considered bonus points.</p> <p>The quizzes will be graded simply as wrong, okay, or correct (0, 0.5, or 1).</p> <p>If you miss a class, there is no chance to redo the quiz due to the bonus quizzes.</p> <p>I repeat again because someone will ask, there are no redo or makeup quizzes.</p>	15%
<p>Midterm One October 11th, 10am to October 14th, 10am</p> <p>Midterm Two November 5th, 10am to November 8th, 10am</p> <p>Midterm Three November 29th, 10am to December 2nd, 10am</p>	Midterm Exams	<p>You have three midterm exams. Each midterm exam will consist of 45 multiple choice questions (or similar, e.g., true-false, matching, etc.).</p> <p>Midterm exams will cover all course material to date, including all previously covered material.</p> <p>Midterm exams will be online and will be open for a 72-hour window during the times outlined in this course outline.</p> <p>You will have a chance to redo your midterm exams during the final exam period, in the three days prior to the scheduled final. If you choose to redo your exam, I will count the higher of the two scores. If you miss a midterm exam window, then the redo exam window in December is your chance to make it up.</p>	15% each, 45% in total

		<p>Each midterm is scheduled for 60 minutes. As we all have a variety of different learning styles, I will give you an additional 30 minutes as an accommodation to complete the exam.</p> <p>Midterm exam questions will be presented in a linear fashion, once you answer, there is no going back to a previous question.</p>	
University Exam Period	Final Exam	<p>Your final exam will consist of a single essay question. We will spend the entire course preparing for these essay questions.</p> <p>The course instructor will randomly select one of the final exam questions (see below). You will answer the question in essay format. The questions are:</p> <ol style="list-style-type: none"> 1. How do we learn? 2. What do we learn? 3. How can we improve learning? <p>The final exam is cumulative in nature – you will need to incorporate material from throughout the course to answer the essay question.</p> <p>Guidance on how to prepare for the final exam will be provided throughout the course.</p> <p>The exam is a two-hour exam. But again, to accommodate a wide range of learning styles you will have an additional hour to complete the exam.</p> <p>If you miss the Final Exam, the redo exam will be in December of 2025.</p>	40%
	Final Grade	100% = 15% quizzes + 45% Midterms + 40 % Final	
	Bonus Points	<p>Extra point activities can be completed to earn additional points. Guidelines for each bonus point activity will be provided with bonus assignments at the instructor's discretion. Bonus points may or may not be awarded dependent on the quality of the response. There are no additional bonus points in this course.</p>	

Marking

For detailed grading rubrics for your final exam please see my teaching website.

Redo Policy

In this course, you will have the opportunity to redo your midterm exams as outlined above. For midterm exams, there is a set redo date (i.e., the December exam period) when you can attempt to improve your score. Note, you must have attempted a midterm exam and achieved at least a grade of 70% to do a redo exam. I will always take the higher of the two exam grades.

Missed Exams

Due to the redo policy any missed midterm exams will not be made up. The student will be assigned a grade of zero and will simply have the redo opportunity during the exam period to complete the exam unless express approval is given by the course instructor before the scheduled exam date. If a student misses the final exam, they will be given an opportunity to rewrite the exam in December of 2025. There are no exceptions to this policy.

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term, as in all other courses at UVic, you will have the opportunity to complete a confidential survey regarding your learning experience (CES). The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future.

Grade Scaling

In order to fight grade inflation, the grades of this course may be scaled up or down at the course instructor's discretion to meet a course average between 78 and 82%.

Grading Scale

As approved by the University of Victoria Senate effective May 1, 2014, a percentage grade will be assigned for the overall course grade. The university policy regarding grading can be reviewed at: <https://web.uvic.ca/calendar2018-09/undergrad/info/regulations/grading.html#> and includes the grading scale:

A+	90-100
A	85 - 89
A-	80 - 84
B+	77 – 79
B	73 – 76
B-	70 - 72
C+	65 – 69
C	60 - 64
D	50 – 59
F	0 - 49

Academic Integrity

Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences.

The responsibility of the institution

Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

The responsibility of the student

Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the student's transcript, or a suspension.

It is your responsibility to understand the University's policy on academic integrity:

<https://web.uvic.ca/calendar2018-09/undergrad/info/regulations/academic-integrity.html#>

Diversity Policy

Our Faculty of Education embraces an inclusive learning community that respects and recognizes that we are enriched and strengthened by diversity including, but not limited to, ethnicity and national origins, language, gender and gender identity, sexuality, ability, age, socioeconomic status, and spirituality. We are committed to increasing the participation of people who have been historically and systemically excluded from higher education and welcome all who share this aspiration. We are committed to answering the Calls to Action from the Truth and Reconciliation Commission of Canada. We are a campus that educates for and encourages respect, acceptance of others, inclusion and diversity, with one principal limit: acts that incite hatred, espouse or encourage bigotry, either implied or explicit, will not be tolerated.

Please also consult the UVic equity policy: <https://www.uvic.ca/equity/index.php>

Support for Students

- **Centre for Academic Communication (CAC).**

The CAC provides face-to-face and online assistance in reading, writing, speaking, and academic expectations. To find out more and/or to book an appointment, please follow this link

<http://www.uvic.ca/learningandteaching/cac/index.php>

- **UVic Counselling Services.**

Counselling Services can help you make the most of your university experience. We offer free professional, confidential, inclusive support to currently registered UVic students. To find out more and/or to book an appointment, please follow this link <http://www.uvic.ca/services/counselling/>

- **Indigenous Student Community**

UVic and the Indigenous Faculty, Staff and students continue to work towards creating programming that is inclusive and representative of Indigenous peoples heritage and concerns. If you wish to connect with this community, please consult

<http://www.uvic.ca/services/indigenous/index.php/students/supports/students/supports/students/students/index.php>

- **Centre for Accessible Learning (CAL) (formerly the Resource Centre for Students with Disabilities (RCSD))**

The Centre for Accessible Learning (CAL) offers information and support for UVic students with a permanent disability. Students who need classroom accommodations such as alternate text formats, or other on-campus support should contact CAL as soon as confirmation of enrollment is received. If you wish to explore options for accommodation, please consult with CAL which is located in the Campus Services Building. The webpage for this centre is <http://www.uvic.ca/services/cal/>

- **Support for International Students**

Please follow this link for programs to support international students.

<http://www.uvic.ca/international/>

- **Policy on Academic Integrity**

<https://web.uvic.ca/calendar2018-09/undergrad/info/regulations/academic-integrity.html#>

<https://web.uvic.ca/calendar2018-09/grad/academic-regulations/academic-integrity.html#>