



University  
of Victoria

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

**Fall 2022**  
**Motor Learning**  
**EPHE 245/A01/11576**

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,
- Successful completion of laboratory assignments, and
- 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
Performance vs Learning  Retention and Transfer	<b>How We Learn</b>	Repetition, Expertise, and Hebbian Learning	Synaptic Plasticity	LTP and LTD
		Feedback	Prediction Errors and RL	Dopamine
The Stages of Learning  The Power Law of Learning	<b>What We Learn</b>	Motor Programs	Motor Representations	Memory as Synaptic Strength
		Motor Schemas	Forgetting	Internal Models
Procedural Memories	<b>How We Can Improve Learning</b>	Distribution and Randomization	Deliberate Practice and Practice Specificity	Sleep
		Variability and Part Practice	Mental Imagery	Aging, Nutrition, and Other Factors

## Course Outline

### Background Material

September 8	Performance versus Learning / Retention and Transfer
September 12	The Power Law of Learning / Stages of Learning
September 15	Procedural Memories

### Introductory Material

September 19	QUEENS FUNERAL DAY
September 22	Repetition, Expertise, and Hebbian Learning
September 26	Feedback
September 29	Motor Programs
October 3	Motor Schemas
October 6	Distribution and Randomization
October 10	THANKSGIVING
October 13	Variability and Part Practice
October 17	Midterm One

### Intermediate Material

October 20	Synaptic Plasticity
October 24	Prediction Errors and Reinforcement Learning
October 27	Motor Representations
October 31	Forgetting
November 3	Deliberate Practice and Practice Specificity
November 7	Mental Imagery
November 10	READING BREAK
November 14	Midterm Two

### Advanced Material

November 17	LTP and LTD
November 21	Dopamine
November 24	Memory as Synaptic Strength
November 28	Internal Models
December 1	Sleep
December 5	Aging, Nutrition, and Other Factors

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

## Assignments

Due Date	Activity	Details	Grade
Every Day	Quizzes	<p>Each class in the Introductory, Intermediate, and Advanced topics will start with a short quiz on the assigned videos and readings. There will be 18 quizzes in total worth 15% of your course grade. The quizzes will be graded simply as wrong or right (0 or 1). If you miss a class, there is no chance to redo the quiz.</p> <p>There are quizzes for the first three background topics that are optional, these will count as bonus points if completed although the total for the Quiz section cannot exceed 15%.</p> <p>I repeat again because someone will ask, there are no redo quizzes. You have 21 attempts to get 15 points, that allows you to miss 6 classes and still get 100%. NO MAKEUPS OR REDOS.</p>	15%
October 13	Midterm One	<p>The midterm exam will consist of 3 short answer questions chosen randomly from the 6 Introductory topics (10%). These questions are already available on my website.</p> <p>The second section of the midterm exam (worth 5%) will consist of a single application question. You will be given three possible questions to answer, and you will choose one of them. The application question is designed to test your ability to apply what you have learned.</p>	15%
November 7	Midterm Two	<p>The midterm exam will consist of 3 short answer questions chosen randomly from the 6 Intermediate topics (10%). These questions are already available on my website.</p> <p>The second section of the midterm exam (worth 5%) will consist of a single application question. You will be given three possible questions to answer, and you will choose one of them. The application question is designed to test your ability to apply what you have learned.</p>	15%

University Exam Period	Final Exam	<p>Your final exam will consist of two sections.</p> <p>The first section of the final exam will be the same as the Midterm exams. There will be 3 short answer questions chosen randomly from the 6 Advanced topics (10%). These questions are already available on my website.</p> <p>There will also be a single application question (5%), as with the midterms you will have a choice from three possible questions. The application questions are designed to test your ability to apply what you have learned.</p> <p>The second section of the final exam (worth 25%) will consist of a single essay question selected from these three questions:</p> <ol style="list-style-type: none"> <li>1. How do we learn?</li> <li>2. What do we learn?</li> <li>3. How can we improve learning?</li> </ol> <p>On the day of the exam I will randomly select one of the three questions and you will answer it.</p> <p>The final exam is cumulative in nature – you will need to incorporate material from throughout the course to answer the application and essay questions.</p> <p>Guidance on how to prepare for Exam Three will be provided throughout the course.</p>	40%
Will be provided by your laboratory instructor.	Laboratory or Practicum	<p>You will have the opportunity between completing a traditional laboratory or organizing your own motor learning practicum. If you choose to complete the laboratory just go to your assigned laboratory section (and only that section!). If you choose to do the practicum see the information on my teaching website and talk to me.</p>	15%
Final Grade			100%
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. Bonus points may or may not be awarded dependent on the course instructor's discretion.</p>		

**Marking**

For detailed grading rubrics for your midterm and final exams please see my teaching website.

**Grade Restrictions**

To pass this course you must have a passing grade in the laboratory portion of the course. If you fail the laboratory portion of the course, you fail the course as a whole.

**Missing / Late Work**

Any late work (assignments, labs, etc) will be assigned a grade of zero. No exceptions.

**Redo Policy**

In this course, you will have the opportunity to redo your class exams. For exams, there is a set redo date (i.e., the Final Exam) when you can attempt to improve your score based on the feedback that is provided to you. You will also be given an additional opportunity to redo Exam One and Two before the Final Exam (one week after Midterm Exams are returned – exact dates TBD). Note, you have to have attempted a midterm exam and achieved at least a grade of 70% to do a redo exam.

There will also be redo opportunities in the laboratory section of the course. These opportunities will come in the form of being able to show your assignment to the teaching assistant BEFORE it is formally due. It will be up to you to ensure that the teaching assistant has sufficient time to provide feedback.

**Missed Exams**

Due to the redo policy any missed exams will not be made up. The student will be assigned a grade of zero and will simply have the redo opportunity on the Final 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 2023. There are no exceptions to this policy.

**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. Grade scaling will also apply to the laboratory section of the course.

**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. When it is time for you to complete the survey you will receive an email inviting you to do so. Please ensure that your current email address is listed in MyPage. If you do not receive an email invitation, you can go directly to <http://www.uvic.ca/learningandteaching/students/resources/ces/login.php>.

You will need to use your UVic netlink ID to access the survey, which can be done on your laptop, tablet, or mobile device. I will remind you and provide you with more detailed information nearer the time but please be thinking about this important activity during the course.

### 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:

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

### 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#>