

**Faculty of Education**

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

**Fall 2023 Motor Learning**

**EPHE 245/A01/11583**

Instructor: Mr. Mathew Rocha Hammerstrom

Class Location: MCK 150

Class Times: Monday / Thursday 8:30am to 9:50am E-mail: [mathewhammerstrom@uvic.ca](mailto:mathewhammerstrom@uvic.ca)

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Office Hours: By appointment

[https://www.krigolsonteaching.com/ephe](http://www.krigolsonteaching.com/ephe-245.html)-[245.html](http://www.krigolsonteaching.com/ephe-245.html)

“We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the university stands, and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.”

# [Visit First People’s House](https://www.uvic.ca/services/indigenous/house/)

[Academic integrity](https://www.uvic.ca/students/academics/academic-integrity/index.php)

Students are required to abide by all academic regulations set as set out in the University calendar, including standards of academic integrity. Violations of academic integrity (e.g. cheating and plagiarism) are considered serious and may result in significant penalties.

Please note: your uvic.ca email should be used for any correspondence that contains confidential information, including V00#s Personal information sent from or to a non-UVic email could be stored on a server outside of Canada, potentially violating privacy legislation.

# 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, with specific focus on motor skills.

# 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.

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](http://www.krigolsonteaching.com/ephe-245.html)-[245.html](http://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 |  | Repetition,  Expertise, and Hebbian Learning | Synaptic Plasticity | LTP  and LTD |
| Retention and Transfer | **How We Learn** |  |  |  |
|  |  |  |
|  |  | Feedback | Prediction Errors and RL | Dopamine |
| The Stages of Learning | **What We Learn** | Motor Programs | Motor Representations | Memory as Synaptic Strength |
|  |  |  |
| The Power Law of Learning |  | Motor Schemas | Forgetting | Internal Models |
| Procedural Memories | **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 |

# Course Outline

Background Material

September 11

September 14

September 18

Performance versus Learning / Retention and Transfer The Power Law of Learning / Stages of Learning Procedural Memories

Introductory Material

September 21

September 25

September 28

October 2

October 5

October 9

October 12

October 16

Repetition, Expertise, and Hebbian Learning Feedback

Motor Programs

University Closed for National Day for Truth and Reconciliation Motor Schemas

University Closed for Thanksgiving

Practice Distribution, Variability

Midterm One

Intermediate Material

October 19

October 23

October 26

October 30

November 2

November 6

November 9

November 13

Synaptic Plasticity

Prediction Errors and Reinforcement Learning Motor Representations

Forgetting

Deliberate Practice and Practice Specificity Mental Imagery

Midterm Two

Reading Break

Advanced Material

November 16

November 20

November 23

November 27

November 30

December 4

LTP and LTD Dopamine

Memory as Synaptic Strength Internal Models

Sleep

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.

**Marking Breakdown**

|  |  |  |  |
| --- | --- | --- | --- |
| Due Date | Activity | Details | Grade |
| Every Class | Quizzes | 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.  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%.  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. | 15% |
| October 16 | Midterm One | The midterm exam will consist of multiple-choice questions designed to test your knowledge of the introductory material. | 15% |
| November 13 | Midterm Two | 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.  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. | 15% |
| November  30 | Assignment  One | The assignment in this class will be a written report where you will be asked to apply course concepts to a specific motor skill example. You will be given prompts to link this motor skill to material on how and what we learn, as well as how we improve learning. | 15% |
| University  Exam Period | Final  Exam | Your final exam will consist of two sections.  The first section of the final exam will be the same as midterm 2. There will be 3 short answer questions chosen randomly from the 6 Advanced topics (15%). These questions are already available on the course website.  The second section of the final exam (worth 25%) will consist of a single essay question selected from these three questions:   1. How do we learn? 2. What do we learn? 3. How can we improve learning?   On the day of the exam I will randomly select one of the three questions and you will answer it.  The final exam is cumulative in nature – you will need to incorporate material from throughout the course to answer the application and essay questions.  Guidance on how to prepare for Exam Three will be provided throughout the course. | 40% |
| **Final Grade** |  |  | **100%** |
| Bonus Points |  | 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. |  |

**Marking**

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

# Grade Restrictions

# See the university grading policy: <https://www.uvic.ca/humanities/atwp/current-students/grading/index.php>

# 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.

# Missed Exams

Due to the redo policy any unexcused 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.

# 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.](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://www.uvic.ca/humanities/atwp/current-students/grading/index.php>

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** |

**Copyright**

*All course content and materials are made available by instructors for educational purposes and for the exclusive use of students registered in their class. The material is protected under copyright law, even if not marked with a ©.* ***Any further use or distribution of materials to others requires the written permission of the instructor, except under fair dealing or another exception in the Copyright Act.*** *Violations may result in disciplinary action under the Resolution of Non-Academic Misconduct Allegations policy (AC1300).*

# 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#

#### **Faculty of Education’s Abridged Equity, Diversity, Inclusion and Decolonization (EDID) Statement**

Our Faculty of Education acknowledges and respects the privilege and responsibility we have to live and learn together on the traditional territories of the lək̓ʷəŋən Peoples including the Songhees, Esquimalt and WSÁNEĆ Peoples whose unwavering relationship with the land continue to this day. In this regard, we commit to including the following local Coast Salish values and teachings[[1]](#footnote-1) to help guide, shape and envision what we do and how in the Faculty of Education:

1. **Héʔəkʷ ʔə cə čəléŋən ɫtə  
   HÁEQ ȽTE OL TŦE ĆELÁṈEN ȽTE** – Remember our ancestors/birthright.
2. **Nəc̓əmaat kʷəns čeʔi**  **ĆȺNEUEL OL** – Work together.
3. **Nəw̓es šxʷ cən ʔay̓ šqʷeləqʷən  
   ÁMEḴT TŦEN ÍY, ŚḰÁLEȻEN** – Bring in your good feelings.
4. **Leʔt šxʷ helə ʔə cə mak̓ʷ sčeʔi səʔ  
   TU LÁTES MEQ EN SĆȺ SE** – Be prepared for all work to come.

Underpinning these local values and teachings is our collective responsibility to respect and recognize the integral relationship between *equity-as-fairness* and *inclusive excellence*. *Equity-as-fairness* means that everyone has access to support(s) they need to succeed, and are enriched and strengthened by *diversity* including, but not limited to, ethnicity and national origins, language, gender and gender identity, sexuality, ability, age, class and spirituality. The Faculty of Education also commits to approaching EDID from an intersectional lens. As such, advancing issues related to LGBTQIA2S, BIPoC, MMIWG, disabilities and social class diversity (inclusive of poverty discrimination) aligns with our EDID mission of working together to address all forms of discrimination. *Inclusive excellence* means supporting, celebrating and affirming how *diversity* can deepen learning, enhance critical thinking and problem solving, and fuel creativity and innovation in our teaching and learning, research and artistic enquiry, professional service, and community engagement within our Faculty of Education, and beyond. In achieving both *equity-as-fairness* and *inclusive excellence*, we are committed to implementing

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](http://www.uvic.ca/equity/index.php)

**Support for Students**

* [**Centre for Accessible Learning (CAL)**](https://www.uvic.ca/services/cal/)

CAL works with faculty and students to promote educational equity and accessibility for students with disabilities and support them in achieving academic goals. If you need classroom accommodations such as alternate text formats, or other on-campus support, contact CAL to explore options for accommodation [consult with CAL](https://www.uvic.ca/services/cal/)

* [**Indigenous Academic & Community Engagement**](https://www.uvic.ca/services/indigenous/index.php)

To support the success of Indigenous students attending UVic. Before, during and after your time at UVic, they're here to connect you with the educational, financial and cultural resources available on campus and in local communities.

* [**Centre for Academic Communication (CAC)**](https://www.uvic.ca/learningandteaching/cac/)

The CAC offers assistance in reading, writing, speaking, and understanding academic expectations, and other aspects of academic communication.

* **[Student Wellness Centre](https://www.uvic.ca/student-wellness/)**

Wellness support for students. Their team of practitioners offer a variety of services to support students’ mental, physical and spiritual health. A note to remind you to take care of yourself. Diminished mental health can interfere with optimal academic performance. Do your best to engage in self-care and maintain a healthy lifestyle this semester. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. The UVic Student Wellness Centre provides cost-free and confidential mental health services to help you manage personal challenges that impact your emotional or academic well-being.

* [**Support for International Students**](https://www.uvic.ca/international/home/contact/iss/index.php)

Programs to support international students.

* **Sexualized Violence Prevention and Response at UVIC**

UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting www.uvic.ca/svp. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:

Where: Sexualized violence resource office in EQHR, Sedgewick C119 [Website](https://www.uvic.ca/services/studentlife/student-conduct/sexualized-violence/) Phone: 250.721.8021 Email: svpcoordinator@uvic.ca

1. University of Victoria Indigenous Plan 2017-2022, p. 9. [↑](#footnote-ref-1)