

ITL-836: Mechanisms of Learning and Instructional Design

Credit Hours:

3+0

Prerequisites:

None

Course Objectives:

This course provides an in-depth exploration of the fundamental mechanisms that underpin human learning, integrating perspectives from cognitive psychology, neuroscience, education, and the learning sciences. Students will investigate how attention, memory, motivation, feedback, and social interaction shape the acquisition and application of knowledge. Alongside these theoretical foundations, the course introduces practical strategies that learners can apply to enhance their own learning, such as chunking, retrieval practice, managing procrastination, and developing metacognitive awareness. The course balances scientific depth with real-world applications, preparing students to critically analyze learning research and design evidence-based learning environments. By the end of the course, the students will be able to:

1. Explain the cognitive, neural, and social mechanisms that support learning.
2. Analyze how attention, perception, memory, and retrieval contribute to knowledge acquisition.
3. Evaluate the roles of motivation, emotion, and feedback in shaping learning outcomes.
4. Critically assess the implications of neuroplasticity and metacognition for lifelong learning.
5. Apply theories of learning mechanisms to the design of educational practices, interventions, and technologies.

Course Contents:

- Introduction to Learning Science
 - Historical and interdisciplinary perspectives
 - Why understanding learning mechanisms matters
 - What do we mean by “learning how to learn”?
- Attention and Perception
 - Selective and sustained attention
 - Perception as a gateway to learning
 - Illusions of learning and overconfidence
- Memory and Encoding
 - Working memory and cognitive load

- Long-term memory, schema theory, consolidation
- Practical strategies: chunking, memory techniques
- Practice and Retrieval
 - Testing effect, spacing effect, and interleaving
 - Retrieval as a mechanism of strengthening knowledge
 - Using self-assessment as a learning tool
- Feedback and Error Correction
 - Immediate vs. delayed feedback
 - Error-driven and reinforcement learning
 - How experts use mistakes to accelerate mastery
- Motivation, Emotion, and Procrastination
 - Intrinsic vs. extrinsic motivation
 - Emotional influences on learning and memory
 - Overcoming procrastination with cognitive strategies
- Social and Cultural Dimensions of Learning
 - Vygotsky and Sociocultural Theory
 - Peer-based and collaborative learning
 - Renaissance learning: integrating creativity across domains
- Metacognition and Self-Regulation
 - Monitoring and controlling one's own learning
 - Developing self-regulated learners
 - Unlocking personal learning potential
- Neuroplasticity and the Brain
 - Biological foundations of learning
 - Critical periods and lifelong adaptability
 - Neural basis of focused vs. diffuse thinking
- Applied Perspectives
 - Instructional design and learning technologies
 - Case studies from classrooms, workplaces, and digital learning
- Challenges and Misconceptions in Learning
 - Myths about learning styles, multitasking, and "left vs. right brain"
 - Evaluating evidence-based vs. pseudoscientific practices
- Future Directions in Learning Research
 - AI, neuroscience-informed education, and personalized learning

- Ethical and equity considerations in applying learning science

Course Learning Outcomes:

At the end of the course, the students will be able to:

1. Demonstrate mastery of core theories of learning mechanisms from psychology, neuroscience, and education.
2. Critically evaluate empirical research on learning processes in diverse contexts.
3. Design strategies for instruction and assessment that leverage evidence-based mechanisms of learning.
4. Integrate insights from interdisciplinary perspectives to address challenges in educational practice.
5. Develop a research-informed perspective on the future of learning in digital, global, and culturally diverse contexts.

Reference Materials/ Books:

1. Ambrose, S. A., et al. (2010). How Learning Works: Seven Research-Based Principles for Smart Teaching.
2. Carey, B. (2015). How We Learn: The Surprising Truth About When, Where, and Why It Happens.
3. Illeris, K. (2018). Contemporary Theories of Learning.
4. Sawyer, R. K. (Ed.). (2014). The Cambridge Handbook of the Learning Sciences.
5. Brown, P. C., Roediger, H. L., & McDaniel, M. A. (2014). Make It Stick: The Science of Successful Learning.
6. Immordino-Yang, M. H. (2016). Emotions, Learning, and the Brain: Exploring the Educational Implications of Affective Neuroscience.