



SPORT SCIENCE & MANAGEMENT
SS3411 MOTOR CONTROL AND LEARNING: FROM THEORY TO PRACTICE

Pre-requisites	SS2101 Foundations of Motor Behaviour
No of AUs	3
Contact Hours	Total hours: 39

Course Aims

The aim of this course is to provide you with a sound understanding of the development of motor skills over time and knowledge to develop practical skills in designing practice sessions. The course will focus on the central questions of why, when, and how movements become coordinated over time by way of reflecting on current theories and research. In particular, this course will adopt the dynamical systems theory as the main paradigm to investigate coordination between limbs (intrapersonal) and between individuals (interpersonal). Topics related to movement variability, sports expertise, visual perception, degrees of freedom, talent development, and specific practical strategies related to skill acquisition will be covered.

Intended Learning Outcomes (ILO)

By the end of the course, you should be able to:

1. Describe and critique on the current debate the theoretical paradigm used to study motor control and learning
2. Make educated deductions grounded in theoretical paradigm about the definition of motor expertise in various sports activities
3. Assess and evaluate motor coordination in both individual and collective sport activities
4. Identify key features of existing intervention design, analyse and apply relevant modifications to enhance skill acquisition.

Course Content

The following topics will be covered:

1. Functional role of movement variability
2. Definition and assessment of Motor expertise
3. Motor Coordination from a Dynamical Systems perspective
4. Interpersonal Coordination and expertise in team games
5. Dynamics of motor learning and skill acquisition
6. Perception-action coupling: Ecological Dynamics perspective
7. Instructional Constraints: Focus of attention
8. Nonlinear Pedagogy
9. Sport Expertise: Visual Perception
10. Talent Development: Early diversification or Early specification

Assessment (includes both continuous and summative assessment)

Component	Course ILO Tested	Related Programme LO or Graduate Attributes	Weighting	Team /Individual	Assessment rubrics
1. Individual assignment	1, 2, 3	A1, A3, B1, B2,	20%	Individual	Appendix 2
2. Group Presentation	3, 4	C1, C2, A1, B2, B4, A3, E1	30%	Group (25%) Individual (5%)	Appendix 1.A Appendix 1.B
3. Final written Examination	1-4	A1, A2, B1, B2, B4	50%	Individual	
Total			100%		

Graduates of the SSM programme should show:

Competence

A1: {Understanding}

process and interpret information, evidence and methodologies related to sport science or sport management

A2: {Self-discipline}

independently apply themselves to solve relevant problems

A3: {Modern Tool Usage}

use technology to communicate and provide feedback on sports activities, improve sports performance, monitor and increase physical activity, provide exercise prescription, solve problems for disadvantaged athletes/sportspeople, and commercialize and innovate sports products, events and services

Creativity

B1: {Critical Thinking}

critically assess the applicability of sport science and sport management tools toward problems and in the workplace

B2: {Analytical Thinking}

critically analyze data from a multitude of sources

B3: {Interdisciplinary Thinking}

connect the subfields of sport science and sport management to tackle problems

B4: {Innovation}	be able to develop new applications or improve existing techniques
B5: {Entrepreneurship}	develop new ideas and plans for sport science, businesses and events
Communication	
C1: {Effective Communication}	present findings or ideas from sport science and sport management research logically and coherently at the appropriate level for the intended audience and in all forms of communication
C2: {Teamwork}	work in teams on projects that require sport science or sport management application, and communicate results via demonstration, verbally and in written form
Civic-Mindedness	
D1: {Professionalism}	act in a manner that respects the profession and meets the expectations of the sport science and sport management industry
D2: {Inclusiveness}	promote sport and physical activity in all individuals to bring people together and improve physical, social and psychological outcomes
Character	
E1: {Ethical behavior}	act with integrity and in a socially responsible and ethical manner in line with societal and legal expectations in relation to collecting and analyzing data of people and protecting personal data with appropriate computer security
E2: {Sportspersonship}	demonstrate appropriate safety, concern and good conduct in sport situations towards other individuals involved in the activity

Formative feedback

Feedback for learning will be verbal provided during each laboratory class session where you have the opportunity to learn techniques and apply yourselves to problems related to movement evaluation in sport and designing relevant intervention.

Feedbacks will be provided through recurrent personal self-assessment through different quiz proposed during each lesson via smartphone app (particularly Socrative).

During the completion of the Group Presentation, as a group, you will be provided with verbal feedback pertaining to your assessed performance. Generic verbal and written feedback will be provided to the class for the test and final examination.

Throughout the course, you will have opportunity to use recording devices to help record your fellow classmates demonstrating anatomical and muscular movements for observation and analysis. During the learning process, you will receive verbal feedback

on the techniques and mistakes in observation and analysis. Suggestions for improvement will be provided.

Learning and Teaching approach

Approach	How does this approach support you in achieving the learning outcomes?
Lectures	Lectures will provide information for key learning concepts and theories and support practical application of those key concepts
Laboratories	Laboratories will: <ul style="list-style-type: none"> - Give hands-on experiential learning to support key theories and information provided in class - Provide tasks for you to utilise what they recently learned to solve specific problems. - Give space and time for small group activities and discussions to allow you to assimilate the content and for sharing learning - Allow opportunity for verbal feedback from instructor to you on techniques and material.
Online learning	Time will be given for learning from online materials as a part of flip teaching approach. These materials will support key concepts covered in lectures and laboratories (e.g. podcast).

Reading and References

- a. Chow, J. Y., Davids, K., Button, C., & Renshaw, I. (2016). *Nonlinear Pedagogy in skill acquisition: An introduction*. London: Routledge.
- b. Davids, K., Button, C., & Bennett, S. (2008). *Dynamics of skill acquisition: A constraints-led approach*. Champaign, IL: Human Kinetics
- c. Davids, K., & Savelsbergh, G. J. P. (2010). *Motor learning in practice: A constraints-led approach*. London: Routledge.
- d. Rose, D. J., & Christina, R. W. (2006). *A multilevel approach to the study of motor control and learning*. San Francisco: Pearson/Benjamin Cummings.

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned pre-class readings and activities, attend all classes – lecture and laboratory - punctually and submit all scheduled assignments and take tests by due dates. You are not allowed to swap laboratory groups without express permission from the course coordinator. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for sessions they have missed. You are expected to participate in all discussions and class activities unless there is a valid medical reason not to do so.

(2) Absenteeism

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

If you miss a lecture, you must inform the course instructor via email prior to the start of the class.

(3) Absence Due to Medical or Other Reasons

If you are sick and not able to complete a test or submit an assignment, you have to submit the original Medical Certificate (or another relevant document) to the Sport Science & Management (or Home School) administration to obtain official leave. Without this, the missed assessment component will not be counted towards the final grade. There are no make-ups allowed.

(4) Attire and safety

You are expected to participate in practical laboratory activities. Some of these activities involve exercise. All of you are expected to wear appropriate attire for participation, obey laboratory safety rules, and take appropriate care of and return all equipment after use.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Collaboration is encouraged for your work in the class and laboratories because peer-to-peer learning helps you understand the subject better and working in a team trains you to better communicate with others. Working together and exchanging ideas and experiences will help improve the quality of your assessed presentation. It is important to credit others for their contribution to your work which promotes ethical practices and academic integrity.

Course Instructors

Instructor	Office Location	Phone	Email

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
------	-------	-----------	----------------------

1	Functional Role of movement variability	LO1	Chapter XX, Pages XX-XX
2	Movement Variability in Postural Control	LO1, LO2	Chapter XX, Pages XX-XX
3	Motor coordination from a dynamical systems perspective	LO1, LO3	Chapter XX, Pages XX-XX
4	Motor expertise definition from a dynamical systems perspective	LO3	Chapter XX, Pages XX-XX
5	Interpersonal Coordination and expertise in team games	LO3	Chapter XX, Pages XX-XX
6	Dynamics of motor learning and skill acquisition	LO1, LO3	Chapter XX, Pages XX-XX
7	The ecological dynamics perspective: perceptual-motor skill	LO1	Chapter XX, Pages XX-XX
8	Instructional constraints: Focus of attention	LO1, LO4	
9	Nonlinear pedagogy	LO4	Chapter XX, Pages XX-XX
10	Visual perception in sport expertise	LO1, LO2,	Chapter XX, Pages XX-XX
11	Work group	LO2, LO3, LO4	Chapter XX, Pages XX-XX
12	Talent development: Early diversification versus Early specialization	LO1, LO2	Chapter XX, Pages XX-XX
13	Presentation of work group	LO2, LO3, LO4	Chapter XX, Pages XX-XX

Appendix 1

1.A GROUP PRESENTATION (25%)

	A+, A, A-	B+, B	B-, C+, C	D+, D	F
Quality of presentation (max 25)	Information provided clearly answers the question set out. Presentation is clear and the flow is coherent and logical. Pace is appropriate.	Information mostly answers the question set. Presentation is mostly clear and the flow generally coherent and logical.	There are weaknesses or absences in the information provided and the flow of presentation is unclear at times.	Much of the information provided does not answer the question and the flow is difficult to understand.	Little relevant information and unclear flow.
Familiarity with material (max 40)	Demonstrates a very good understanding of the material. Able to answer questions in a poised and articulate manner with a high level of confidence.	Demonstrates a good understanding of the material. Able to answer most of the questions clearly and with confidence.	Demonstrates a basic understanding of the material. Able to answer some of the questions clearly but lacks confidence at times.	Demonstrates a weak understanding of the material. Has difficulty in answering questions and lacks confidence.	Does not demonstrate any understanding of the material. Unable to answer questions.
Use of technology (max 10)	Uses relevant technology very well to supplement and enhance the quality of presentation.	Good use of technology to improve the presentation.	Some use of technology to help improve the presentation.	Little use of relevant technology in the presentation.	No clear use of technology in the presentation.
Communication and teamwork (max 25)	Communication is very clear and easy to understand. All members of the team make strong, worthwhile contributions.	Communication is clear and easy to understand most of the time. Most members of the team make good contributions.	Communication is unclear at times. Varied contributions of different team members.	Communication is unclear and there and difficult to understand. Most contribution provided by a single team member.	Communication is unclear and not possible to understand. No team member makes worthwhile contribution.

1.B OUTCOME OF PEER EVALUATION OF INDIVIDUAL CONTRIBUTION (5%)

Every group to give a mark for each member.

Marking Criteria	Below Expectation	Meeting Expectation	Exceeding Expectation
Peer Evaluation (within team members)	Individual contributed very little to team project.(0-1 marks)	Individual contributed an expected level to team project.(2-3 marks)	Individual contributed more than expected level to team project. (4-5 marks)

Appendix 2

INDIVIDUAL ASSIGNMENT (20%)

	A+, A, A-	B+, B	B-, C+, C	D+, D	F
Presentation and definition of the concepts	Information provided clearly referenced definition. Examples are representative, clear and coherent.	Information mostly present the concept. Explanation is mostly clear and the flow generally coherent and logical. At least one example is well defined	There are weaknesses or absences in the definition provided and the flow of presentation is unclear at times. Examples are unclear or irrelevant.	Much of the information provided does not help to define the concept and the flow is difficult to understand.	Little relevant information leading to unclear definition and unclear flow. No or poor examples are provided.
Application of theoretical knowledge to practical contexts	Clear demonstration of how theory can be applied to practice	More than adequate evidence to show how theory can be applied to practice	Adequate evidence to show how theory can be applied to practice	Little evidence to show how theory can be applied to practice	No evidence to show how theory can be applied to practice