The Master of Arts (M.A.) program in Motor Learning (Code: TRM) is designed to provide students with a broad background in movement sciences and related areas. Study focuses on the behavioral, biomechanical and neural bases of development, acquisition and performance of functional movement skills. Acquisition of skill is examined over the life span in typically developing and impaired individuals. Movement analysis is used to elucidate the neuromotor control processes underlying skilled performance in everyday functional behaviors, sport and dance. The teacher or therapist’s role in facilitating skill learning and performance is emphasized.

The M.A. program emphasizes bridging between the movement sciences and clinical or educational practice. The objective is to develop a comprehensive and coherent view of theory and research that can be applied to practice within the student’s professional field.

The program requires 32 points of graduate study and includes:

1. Substantive study of theory and research as embodied in lecture and laboratory courses.
2. Development of clinical or educational skills in laboratory and fieldwork courses.
3. Research training to enable students to read and interpret original research and to carry out educational, clinical or laboratory research.
4. Seminars to discuss theory and research, identification of research problems, and clinical/educational applications.
5. Elective courses to meet specific student needs which may be taken throughout Teachers College in such areas as anatomy, biology, business, chemistry, computer science, health education, higher and adult education, neurosciences, nutrition, physiology, psychology and science education.
A final project is required for the M.A. and may involve one of three options:

1. A scholarly review of research and theory within a topical area drawing application to educational or clinical practice.
2. A basic or applied research report.
3. An educational project including the development of an assessment instrument/method for clinical or educational practice or a presentation for a continuing education program.

For the M.A. degree, students may specialize in one of the three areas (Applied Physiology [Code: TRA], Motor Learning [Code: TRM], Physical Education [Codes: TRP & TRC]) offered within Movement Sciences and Education or, in consultation with an advisor, they may arrange a flexibly-designed program of study cutting across specialization areas which will meet their professional needs and academic interests. The M.A. program can be completed in 12-18 months of full-time study or two to three years of part-time study (depending on the student’s other responsibilities).

Course Work Requirements

**BBS 5060**  Neuromuscular response and adaptation to exercise (2 points).
**BBS 5068**  Brain and Behavior I: Communication in the nervous system (2 points).
**BBSR 5582**  Research design in the movement sciences (3 points).

**Substantive study:** minimally 6 points in movement sciences (BBSR courses including offerings in physical education).

**Laboratory courses:** one course of minimally 2-3 points in movement sciences (BBSR course).

**Seminars, tutorials or conferences:** minimally 2-3 points in movement sciences (BBSR courses).

**Electives:** minimally one course outside of the program in Movements Sciences and Education (non BBSR course at Teachers College for at least 2 points) in addition to BBS 5060 and BBS 5068.

**Individual program:** minimally 6 points in movement sciences (additional BBSR courses in substantive, laboratory, fieldwork or seminar study) and/or related areas outside of the program (including graduate courses at Columbia University) in Movement Sciences and Education (non BBSR courses, including graduate courses at Columbia University).

Special Admission Requirements/Academic Prerequisites

While students have come from a variety of fields, the following backgrounds are most appropriate: movement sciences, exercise science, physical therapy, occupational therapy, physical education, athletic training, biology, nutrition, nursing, and psychology. Students with strong academic records, who have deficiencies in their science backgrounds, may be admitted with the understanding that these deficiencies will be remedied with appropriate courses.
It is recommended that prospective students communicate with an academic advisor to discuss program plans prior to admission. Students are encouraged to make an appointment to visit the college for at least half a day to meet with faculty and current students, to audit a course or seminar, and to become acquainted with research areas and resources. Applicants are reviewed on an ongoing basis throughout the academic year. Prior to formal admission, enrollment in up to 8 points of study as a non-matriculated student is permitted.

**General Department Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>BBS 4032</td>
<td>Neuroscience of human speech and language (2)</td>
</tr>
<tr>
<td>BBS 4050</td>
<td>Applied biomedical instrumentation (3)</td>
</tr>
<tr>
<td>BBS 4065</td>
<td>Biological and behavioral basis of sleep (3)</td>
</tr>
<tr>
<td>BBS 5060</td>
<td>Neuromuscular responses and adaptation to exercise (2)</td>
</tr>
<tr>
<td>BBS 5068</td>
<td>Brain and behavior I: Communication in the nervous system (1-2, <em>ML students</em> 2)</td>
</tr>
<tr>
<td>BBS 5069</td>
<td>Brain and behavior II: Perception, emotion, memory and cognition (1-2)</td>
</tr>
<tr>
<td>BBS 6070</td>
<td>Neural basis of respiration (3)</td>
</tr>
<tr>
<td>BBSQ 4043</td>
<td>The human nervous system (3)</td>
</tr>
</tbody>
</table>

**Courses offered in Movement Sciences and Education**

**Substantive Study**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BBSR 4005</td>
<td>Applied anatomy and biomechanics (3)</td>
</tr>
<tr>
<td>BBSR 4050</td>
<td>Analysis of human movement (3)</td>
</tr>
<tr>
<td>BBSR 4055</td>
<td>Neuromotor processes (3)</td>
</tr>
<tr>
<td>BBSR 4060</td>
<td>Motor learning (2-3, <em>ML students</em> 3 with corequisite BBSR 4865 for 2)</td>
</tr>
<tr>
<td>BBSR 4070</td>
<td>Introduction to the psychosocial aspects of sport and exercise (2-3)</td>
</tr>
<tr>
<td>BBSR 4090</td>
<td>Physical fitness, weight control and relaxation (3)</td>
</tr>
<tr>
<td>BBSR 4095</td>
<td>Applied physiology I (3)</td>
</tr>
<tr>
<td>BBSR 5050</td>
<td>Neurophysiology of motor control and electromyography (3)</td>
</tr>
<tr>
<td>BBSR 5055</td>
<td>Bases of motor control systems (3)</td>
</tr>
<tr>
<td>BBSR 5057</td>
<td>Movement disorders (3)</td>
</tr>
<tr>
<td>BBSR 5095</td>
<td>Exercise and health (3)</td>
</tr>
</tbody>
</table>

**Laboratory Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>BBSR 4151</td>
<td>Laboratory methods in biomechanics (3)</td>
</tr>
<tr>
<td>BBSR 4195</td>
<td>Applied physiology laboratory I (3)</td>
</tr>
<tr>
<td>BBSR 5151</td>
<td>Introduction to the analysis of biomechanical signals (3)</td>
</tr>
<tr>
<td>BBSR 5194</td>
<td>Applied physiology laboratory II (3)</td>
</tr>
<tr>
<td>BBSR 5195</td>
<td>Advanced applied physiology laboratory (3)</td>
</tr>
<tr>
<td>BBSR 6070</td>
<td>Neural basis of respiration (3)</td>
</tr>
</tbody>
</table>
Seminars, Tutorials and Conferences

BBSR 4865  Tutorials in motor learning (0-3)*
BBSR 5596  Topics in applied physiology (3)
BBSR 5860  Movement sciences conference (0-1)
BBSR 6563  Movement sciences conference seminar (2)
BBSR 6564  Advanced topics in neuromotor processes (2-3)
BBSR 6565  Seminar in motor learning and motor control (3)
BBSR 6571  Research seminar in the psychosocial aspects of rehabilitation (3)

*BBSR 4865 counts as a laboratory course, if taken as a corequisite of BBSR 4060.

Fieldwork

BBSR 5200  Fieldwork in movement sciences (1-4)
BBSR 5251  Fieldwork seminar in motor learning and motor control (1-2)
BBSR 6201  Supervision of educational or clinical practice in the movement sciences (0-2)

Research Preparation

BBSR 4900  Research and independent study in movement sciences and education (1 or more)
BBSR 5504  Research training in motor learning (1-3)
BBSR 5582  Research design in the movement sciences (3)
BBSR 5595  Research seminar in applied physiology (3)
BBSR 6900  Supervised independent research in movement sciences (1-9)
BBSR 7500  Dissertation seminar in movement sciences (0-3)
BBSR 8900  Dissertation advisement in movement sciences (0)
MSTC 5000  Neurobiology of consciousness, constructivism and information processing (2-3)

Department of Mathematics, Science and Technology

A description of the above courses can be found at http://www.tc.edu/bbs/Movement/courses.asp
Additional BBSR courses that are offered in Physical Education (Codes: TRC and TRP) can be found in the Teachers College Academic Catalogue at
http://www.tc.columbia.edu/admissions/catalog.htm - click Department of Biobehavioral Sciences. The schedule of the courses offered each term is available at
http://www.tc.columbia.edu/tc%2Dschedule/schdsearch.cgi

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