

**TEACHERS COLLEGE**  
**COLUMBIA UNIVERSITY**

**ACADEMIC CATALOG 2016-2017**

**DEPARTMENT OF BIOBEHAVIORAL SCIENCES**

*Contact:* Professor Yvonne Wallace  
*Email:* ywallace@tc.columbia.edu  
*Phone:* (212) 678-3895  
*Fax:* (212) 678-8233  
*Address:* 1152B Thorndike Hall  
*Box:* 5

**PROGRAMS**

- **MOVEMENT SCIENCE AND EDUCATION ..... 3**  
*including:*
  - Physical Education
  - Kinesiology
  - Motor Learning and Control
  - Applied Physiology
- **CURRICULUM AND TEACHING  
IN PHYSICAL EDUCATION ..... 22**
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# Biobehavioral Sciences

## Contact Information

**Department Chair:** Carol Garber

**Contact:** Yvonne Wallace

**Email:** ywallace@tc.columbia.edu

**Phone:** (212) 678-3895

**Fax:** (212) 678-8233

**Address:** 1152B Thorndike Hall

**Box:** 5

## Mission

The Department of Biobehavioral Sciences offers programs that focus on the application of the biological, physiological, behavioral, and sociocultural sciences underlying human communication, movement, and their disorders to clinical, educational, and community settings. An understanding of the normal and abnormal biobehavioral processes is applied to clinical practice. The scientific knowledge obtained from studying each of these specialized fields is used to enhance the educational, adaptive, and communicative capabilities of individuals with normal and impaired abilities across the lifespan.

Graduates of our master's programs assume professional roles in educational, health-related, and community agency settings as speech-language pathologists, exercise physiologists, occupational therapists, physical therapists, and research coordinators. As these professionals often work in interdisciplinary teams, the department facilitates opportunities for students to interact across professional boundaries.

Our doctoral graduates are prepared for university faculty positions and administrative positions in clinical, educational, and organizational field-based settings. They may also pursue careers in research.

The department maintains clinics and laboratories to support the teaching and research components of the programs. These facilities include the Edward D. Mysak Speech and Hearing Center, as well as laboratories in applied physiology, motor learning, kinematics, language and cognition, and adaptive communication technologies.

The master's degree program in Communication Sciences and Disorders is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association (ASHA).

# Movement Science and Education

Department of - Biobehavioral Science

## Contact Information

**Phone:** (212) 678-3325

**Fax:** (212) 678-3322

**Email:** msnsprogram@tc.edu

**Director:** Professors Andrew Gordon, Carol Ewing Garber, Stephen Silverman

## Program Description

The Program of Movement Sciences and Education at Teachers College, Columbia University excels in graduate education and research in the sub-disciplines of **Kinesiology**, including **Applied (Exercise) Physiology**, **Motor Learning and Control**, **Occupational Therapy** and **Physical Education**. The program has a long tradition of excellence.

**The Applied (Exercise) Physiology** concentration focuses on the physiological effects of exercise and disease and on the promotion of physical activity. The effects of exercise training on physiological processes, behavioral health, and physical and mental well being are emphasized. Through a joint program with nutrition education, students can study Nutrition and Exercise Physiology through the Department of Health and Behavior Studies (Program in Nutrition). Students in Applied Physiology can supplement their work in applied exercise physiology with nutrition classes. Students can apply their academic work to improve health and physical fitness across both healthy and disabled populations. Doctoral students conduct related research in laboratory and health care facilities, and in field settings designed to promote physical activity and health.

Students in the applied exercise physiology specialization have access to a variety of rich resources at Columbia University. Active collaborations exist between our faculty and faculty in the Columbia University School of Medicine, Mailman School of Public Health, and the New York Center for Obesity Research. Students are welcome to participate in these ongoing projects and attend any of the frequent seminars at the Columbia University Medical Center and the New York Center for Obesity Research.

The *Applied (Exercise) Physiology* concentration focuses on the study of the physiological effects of acute and chronic exercise, how exercise and physical activity influences health, and on the promotion of physical activity in community, clinical, and public health settings. The effects of physical activity and exercise training on physiological processes, neuromuscular and biomechanical function, health, and physical well-being are emphasized. Students can apply their academic work to jobs that involve exercise testing and training, including programs designed to improve health and physical fitness in healthy individuals and in people with or at risk for chronic illness or disability and in community, clinical, research, and public health settings.

Three degree programs are offered in *Applied (Exercise) Physiology*: Master of Arts (M.A.), Master of Education (Ed.M.), and Doctor of Education (Ed.D.). In addition, students enrolled in the Doctor of Philosophy Program in Kinesiology may concentrate in *Applied Physiology*. A joint program in *Exercise Physiology & Nutrition* is offered through the *Department of Health and Behavior Studies*.

**Motor Learning and Control** 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 lifespan 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.

**Health and physical education** has a long and distinguished history at Teachers College. Teachers College offered one of the first graduate degrees in health and physical education and continues to offer a wide array of opportunities for graduate study. In addition to courses in curriculum and teaching in physical education, there are a variety of other courses in the movement science, health studies, curriculum and teaching, physical culture, and other areas that provide students with many opportunities for course options. All programs are designed to allow flexibility in program planning.

**Each of these specialties has five components:**

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 the College and University in such areas as Anatomy, Biology, Business, Chemistry, Computer Science, Health Education, Higher and Adult Education, Neurosciences, Nutrition, Physiology, Psychology, Public Health, and Science Education. A list of recommended elective and related courses is available to students in the Movement Science office. At least two courses (for a total of at least 6 points) outside of the program area are required.

## Degree Summary

### APPLIED PHYSIOLOGY

Program Coordinator: *Professor Carol Ewing Garber*

Program Office: (212) 678-3325

Email: ceg2140@tc.columbia.edu

Email: msnsprogram@tc.edu

*Applied Physiology (APHY)*

- Master of Arts (M.A.)
- Master of Education (Ed.M.)
- Doctor of Education (Ed.D.)

*See also: The interdepartmental program in Applied Physiology and Nutrition in the Department of Health and Behavior Studies.*

### MOTOR LEARNING AND CONTROL

Program Coordinator: *Professor Andrew Gordon*

Program Office: (212) 678-3325

Email: agordona@tc.edu

*Motor Learning and Control (MTLG)*

- Master of Arts (M.A.)
- Master of Education (Ed.M.)
- Doctor of Education (Ed.D.)

### PHYSICAL EDUCATION / CURRICULUM AND TEACHING IN PHYSICAL EDUCATION

Program Coordinator: *Professor Stephen Silverman*

Email: [ss928@columbia.edu](mailto:ss928@columbia.edu)

*Curriculum and Teaching in Physical Education (PECT)*

- Master of Arts (M.A.)
- Master of Education (Ed.M.)
- Doctor of Education (Ed.D.)

*Physical Education (PHED)*

- Master of Arts (M.A.)

*Physical Education-Initial Certification (PHED-INIT)*

- Master of Arts (M.A.)

*Physical Education-Professional Certification (PHED-PROF)*

- Master of Arts (M.A.)

## **KINESIOLOGY**

Program Coordinator: *Professor Andrew Gordon*

Program Office: (212) 678-3325

Email: [msnsprogram@tc.edu](mailto:msnsprogram@tc.edu)

*Kinesiology (KINE)*

- Doctor of Philosophy (Ph.D.)

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

# Degree Requirements

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## About the Master's Degree Programs

For the M.A. and Ed.M. programs with specialization in Movement Science and Education, students have two options. They may specialize in one of the three areas offered within Movement Science (Applied Physiology, Motor Learning and Control, Physical Education) or in consultation with an advisor, they may arrange a flexibly-designed program of study cutting across specialization in the movement sciences that will meet their professional needs and academic interests.

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## Master of Arts

The M.A. program emphasizes bridging between the movement sciences and clinical or education 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 study and either a comprehensive examination or a capstone project. Students are expected to make satisfactory progress toward the completion of degree requirements. Program faculty will annually review each student's progress. Please note that satisfactory performance is defined at a minimum as no Incomplete grades and no BBSR or BBS courses in which the grade earned is lower than B.

A final project is required for the M.A. and may involve one of four options, depending on the concentration:

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.
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.
4. An examination covering all core movement science courses, core specialization courses, research methods, and substantive study in movement sciences.

For initial advisement and approval of M.A. projects, students must consult with their academic advisor. 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).

### **Specific requirements for the Motor Learning and Control concentration include:**

- BBS 5060 Neuromuscular responses and adaptation to exercise (2)
- BBS 5068 Brain and behavior I: Communication in the nervous system (1-2)
- BBSR 5582 Research design in the movement sciences (3)
- BBSR 4060 Motor learning (3)
- BBSR 4161 Motor learning laboratory (2, co-requisite BBSR 4060)
- BBSR 4050 Biomechanical analysis of human movement (3)

Substantive study: minimally 6 points in movement sciences (BBSR courses including offerings in physical education) beyond the above listed courses.

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 additional non-BBSR course outside the program in Movement Sciences and Education (course at Teachers College for at least 2 points) besides BBS 5060 and BBS 5068 for 2 points each.

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).

BBSR 5504. Research training in motor learning (2). Students will enroll in this competency-based course during their last year of study to immerse themselves in current research in motor learning and control, as well as to receive advisement for their final project. Note that if all coursework is complete but the student has not yet completed the final project, students must continue to enroll for 1 point (above and beyond the 32 points) each semester until the project is complete.

## Masters of Arts: Applied Physiology

### Degree Description

The Master of Arts program in Applied Physiology requires 32 points of graduate study and typically takes one year of full-time or two years of part time study. The M.A. program provides for advanced study in the movement sciences and for individually designed study to meet the student's professional needs and interests. The following program description concentrates on describing course requirements. A minimum of 32 points of relevant graduate course-work is required for the degree, all of which must be completed at Teachers College.

Students are expected to make satisfactory progress toward the completion of degree requirements. Program faculty will annually review each student's progress. Please note that satisfactory performance is defined at a minimum as no Incomplete grades and no BBSR or BBS courses in which the grade earned is lower than B.

M.A. students who wish to prepare for certifying examinations for exercise physiologists, clinical exercise physiologists, or strength and conditioning specialists, or other professional credentials should consult with an advisor concerning required coursework for eligibility for certification examinations.

The program includes

- Substantive study of applied physiology and movement sciences theory and research as embodied in lecture, tutorials, and special topics courses.
- Development of clinical or educational skills in laboratory and fieldwork courses.
- Research training to enable students to critically read and interpret original research and to carry out educational, clinical, or laboratory research.
- Seminars to discuss movement sciences-related research, identification of research problems, and clinical/educational applications.
- Elective courses to meet specific student needs which may be taken throughout the College. Electives are taken with provision that the total program includes at least three Teachers College courses (for at least 2 points each) outside of the movement sciences. These may include areas such as health education, higher and adult education, neurosciences, nutrition, psychology, and science education. These courses may be taken pass/fail.
- A culminating project or comprehensive examination is required for the M.A. and may involve the following. Students electing options\*\*\* are required to take BBSR 5595 for at least two semesters:
  - (a) A scholarly review of research in applied physiology and movement sciences within a topical area drawing application to practice, OR
  - (b) An applied research study and report in applied physiology and movement sciences, OR
  - (c) An educational project including the development of an assessment instrument/method for

clinical or educational practice or a presentation for a continuing education, health promotion or physical activity program, OR

(d) A comprehensive examination covering all applied physiology core courses, research methods and substantive study in movement sciences.

### **Course Work Requirements**

#### **Specific requirements (and points) for the Masters of Arts in Applied Physiology include**

#### **Required Core Courses (minimum 15 points):**

- BBSR 4095 Applied physiology I (3)
- BBSR 4195 Applied physiology laboratory I (3)
- BBSR 5194 Applied physiology laboratory II (3)
- BBS 5060 Neuromuscular responses and adaptation to exercise (2)
- BBS 5068 Brain and Behavior I: Communication in the nervous system (1-2) or BBSN 4003 Foundations of Neuroscience (3)
- BBSR 5582 Research Design in the Movement Sciences (3)

#### **Substantive Study in Movement Sciences (minimum 6 points).**

These may include the following:

- BBSR 4054 Anatomy and Physiology (3)
- BBSR 4070 Introduction to Psychosocial Aspects of Sport/Exercise (3)
- BBSR 4002 Visual Methods and Educations (3)
- BBSR 4090 Physical Fitness, Weight Control + Relaxation (3)
- BBSR 5044 Applied Physiology II (3)
- BBSR 5055 Basis of Motor Control Systems (3)
- BBSR 5200 Fieldwork in Movement Science and Education (1-3)
- BBSR 5095 Exercise and health (3)
- BBSR 4060 Motor learning (3)
- BBSR 4005 Applied anatomy and biomechanics (3)
- BBSR 5028 Motor Development (3)
- BBSR 5057 Movement disorders (3)
- BBSR 5195 Advanced applied physiology laboratory (3)
- BBSR 4900 Research and Independent Study in Movement Science and Education (1-3) (please note that no more than 3 points in Independent Study will be counted toward the M.A. degree)
- BBSR 5595 Research seminar in applied physiology (1)

#### **Elective Courses outside of Movement Sciences/ Biobehavioral Sciences (a minimum of 6 points).**

Electives may include the following:

- HBSS 4100 Introduction to health education (3)
- HBSS 4102 Principles of epidemiology in health promotion (3)
- HBSS 4118 Relapse prevention for problem behaviors (3)
- HBSS 5110 Determinants of health behavior (3)
- HBSS 4114 Health promotion for multicultural populations (3)
- HBSS 4115 Health promotion for aging adults (3)
- HBSS 5111 Planning health education programs (3)
- HBSS 4140 Developing workplace health promotion programs (3)
- HBSS 4122 Women's health (3)
- HBSV 4000 Introduction to nutrition: Facts, fallacies, and trends (3)
- HBSS 6145 Health psychology (3)
- HBSV 4010 Food, nutrition and behavior (3)



- HBSV 4011 Women and weight, eating problems and body image (2)
- HBSV 4150 Sports nutrition (3)
- HUDM 4120 Basic concepts in statistics (3)
- HUDM 4122 Probability and statistical inference (3)
- ORLD 4051. How adults learn (3)
- ORLD 4053. Facilitating adult learning (3)
- ORLA 5017. Groups and interpersonal behavior (2-6)\*\*\*
- ORLA 4071. The leadership of private schools and non-profit organizations (3)

## Master of Education

The Ed.M. program provides for advanced study in the movement sciences and for individually designed study to meet the student's professional needs and interests. The following program description concentrates on describing course requirements. It is important to recognize that these are only the more formal and identifiable features of the program. A minimum of 60 points of relevant graduate course-work is required for the degree, 30 points of which must be completed at Teachers College. Transfer credit from another university is awarded at the discretion of the faculty advisor. A maximum of 30 points completed outside of Teachers College may be transferred. All coursework taken in fulfillment of the Ed.M. degree requirements may subsequently be applied towards more advanced degrees (Ed.D., Ph.D.). Students can focus on: (a) preparation as a "scholar of practice" who is able to translate research and theory into appropriate clinical or educational strategies; (b) preparation as a clinical instructor, clinical or educational supervisor, or applied investigator; or (c) preparation for study towards the doctoral degree.

Students are expected to make satisfactory progress toward the completion of degree requirements. Program faculty will annually review each student's progress. Please note that satisfactory performance is defined at a minimum as no incomplete grades, and no BBSR or BBS courses in which the grade earned is lower than B. For Ed.M. students satisfactory progress in research/ special project work is also expected.

All Ed.M. students must complete a final, culminating project involving either: (a) an applied research study, which can focus on clinical or educational issues, or (b) a laboratory research study. Students intending to continue study towards the doctoral degree should arrange their Ed.M. program to include core courses required for doctoral specialization in Applied Physiology or in Motor Learning and Control.

For the Master of Education program, specific requirements for courses, or equivalents transferred from prior graduate study, include concentration-specific core course requirements for the M.A. degree, at least 6 points in research methods and statistics, substantive study in movement sciences (minimum 15 points), research seminars or tutorials (minimum 5 points), and elective courses. To meet the College breadth requirement for graduation, students must have a total of three courses (for at least 2 points each) outside of the Movement Sciences Program. Students can meet the breadth requirement through electives or core course requirements, so long as the courses taken to meet those requirements fall outside the program.

Research training students will enroll in either research training in research seminar in applied physiology (BBSR 5595) for at least two semesters during their last year of study to immerse themselves in current research in their movement science concentration as well as receive advisement on their final project. Note that if all coursework is complete but the student has not completed the final project, students must continue to enroll for 1 point (above and beyond the 60 points) each semester until the project is complete.

## Master of Education: Applied Physiology

## Degree Description

The Master of Education program provides for advanced study in the movement sciences and for individually designed study to meet the student's professional needs and interests. This program is particularly recommended for students planning on future professional or doctoral study and research careers and those planning to teach at the community college level.

In the Ed.M. program, students can focus on:

- Preparation as a "scholar of practice," able to translate research and theory into appropriate clinical or educational strategies;
- Preparation as a clinical instructor, clinical or educational supervisor, or research assistant/associate
- Preparation for study towards the doctoral degree (e.g., Ph.D., Ed.D., D.Ph., or M.D.)

## Degree Requirements

The program requires 60 points of graduate study (see specific requirements below) and takes about two years of full-time study or three to four years of part-time study to complete. Students intending to continue study towards the doctoral degree should arrange their Ed.M. program to include core courses required for doctoral specialization.

- Substantive study of applied physiology and movement sciences theory and research as embodied in lecture, tutorials, and special topics courses.
- Development of clinical or educational skills in laboratory and fieldwork courses.
- Research training to enable students to critically read and interpret original research and to carry out educational, clinical, or laboratory research.
- Seminars to discuss movement sciences-related research, identification of research problems, and clinical/educational applications.
- Elective courses to meet specific student needs which may be taken throughout the College and University. Electives are taken with provision that the total program includes at least three Teachers College courses (for at least 6 points) outside of the movement sciences. These may include areas such as anatomy, biology, business, chemistry, computer science, health education, higher and adult education, neurosciences, nutrition, physiology, psychology, and science education. These courses may be taken pass/fail.
- A comprehensive final project of about two semesters duration is required. This may involve:
  - A comprehensive scholarly review of research literature within a basic or applied area in applied exercise physiology.
  - A research study in an applied topical area of applied exercise physiology
  - A comprehensive educational project including the development of an assessment instrument/method for clinical or educational practice or a presentation for a continuing education, health promotion or physical activity program.

### Movement Sciences Core Courses (minimum 12 points)

- BBSR 4095 Applied physiology I (3)
- BBSR 4195 Applied physiology laboratory I (3)
- BBSR 5194 Applied physiology laboratory II (3)
- BBS 5060 Neuromuscular responses and adaptation to exercise (2)
- BBS 5068 Brain and behavior I Communication in the nervous system (1-2) or BBSN 4003 Foundations of Neuroscience (3)
- BBSN 5582 Research Design in the Movement Sciences (3)

### Research Methods (minimum 6 points) These may include but are not limited to:

- HUDM 4120 Basic concepts in statistics (if no undergraduate statistics) (3)
- HUDM 4122 Probability and statistical inference (3)
- BBSR 5001 Introduction to Qualitative Research in Physical Education (3)
- HUDM 5122 Applied Regression Analysis (3)

- HUDM 5123 Experimental Design (3)
- MSTC 5001 Introduction to Qualitative Research in Science (3)
- MSTC 6000 Introduction to Qualitative Research in Science (3)
- HUDM 6122 Multivariate Analysis I (3)
- HUDM 6123 Multivariate Analysis II (3)
- Other TC/CU graduate research methods/ statistics courses with approval of advisor

**Research Seminar (Registration required at least two semesters, minimum 2 points)**

- BBSR 5595 Research seminar in applied physiology (1)

**Substantive study in movement sciences (minimum 6 points).**

- BBSR 5095 Exercise and health (3)
- BBSR 4060 Motor learning (2-3)
- BBSR 4005 Applied anatomy and biomechanics (3)
- BBSR 4055 Neuromotor processes (3)
- BBSR 5028 Motor Development (3)
- BBSR 5057 Movement disorders (3)
- BBSR 5195 Advanced applied physiology laboratory (3)
- BBSR 4900 Research and Independent Study in Movement Science and Education (1-3)

**Elective Courses outside of Movement Sciences**

Elective courses to meet specific student needs, which may be taken throughout the College and University. Electives are taken with provision that the total program includes at least **three** Teachers College courses (for at least 2 points each) *outside of the movement sciences*. These may include areas such as anatomy, biology, business, chemistry, computer science, health education, higher and adult education, neurosciences, nutrition, physiology, psychology, and science education. These courses may be taken pass/fail and may include the following:

- HBSS 4100 Introduction to health education (3)
- HBSS 4102 Principles of epidemiology in health promotion (3)
- HBSS 4118 Relapse prevention for problem behaviors (3)
- HBSS 5110 Determinants of health behavior (3)
- HBSS 4114 Health promotion for multicultural populations (3)
- HBSS 4115 Health promotion for aging adults (3)
- HBSS 5111 Planning health education programs (3)
- HBSS 4140 Developing workplace health promotion programs (3)
- HBSS 4122 Women's health (3)
- HBSV 4000 Introduction to nutrition: Facts, fallacies, and trends (3)
- HBSS 6145 Health psychology (3)
- HBSV 4010 Food, nutrition and behavior (3)
- HBSV 4011 Women and weight, eating problems and body image (2)
- HBSV 4150 Sports Nutrition (3)

## About the Doctoral Programs

In the preparation of doctoral students, the goal is to develop those competencies necessary to pursue scholarly and scientific work and to formulate strategies to enhance professional practice. Formal admission to the doctoral program is based upon level of achievement in coursework and seminars;

demonstration of research competence; a research direction compatible with faculty and laboratory resources; and signs of professional promise. A list of current research projects in Applied Physiology can be obtained from the program coordinator.

Applicants for the Ed.D. degree are reviewed on an ongoing basis throughout the academic year. However, consideration for general and diversity awards is given to those applicants who meet the early application deadline. See the Admissions section of this bulletin for details. Prior to formal admission, enrollment in up to 8 points of study as a non-matriculated student is permitted. Applicants for the Ph.D. in Kinesiology are reviewed once a year subsequent to the December 15th application deadline.

Specialization in Applied Physiology, Motor Learning and Control, or Physical Education is required for the doctoral program in these areas. Within each area of specialization, students prepare course and laboratory projects, research papers, and other materials appropriate for their projected professional activities. The program requires a minimum of 90 points of graduate study.

The doctoral program prepares individuals for leadership roles in the movement sciences and in the fields of physical education, nutrition, dance education, and rehabilitation (occupational, physical and respiratory therapy). Graduates have assumed positions as faculty members and program directors in universities and colleges; as researchers in educational, clinical, or biomedical settings; and as administrators, supervisors, or consultants in clinical or educational facilities. Preparation focuses advanced study and research training within the specialization.

#### **Special Application Requirements, Applied Physiology Programs:**

While students have come from a variety of fields, the following backgrounds are most appropriate: kinesiology, 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 on a provisional basis with the understanding that these deficiencies will be remedied with appropriate courses taken in addition to those required for the M.A. degree. It is strongly recommended that students without undergraduate coursework in anatomy and physiology (usually a two-semester sequence with laboratory) take these courses prior to entering the program. 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 to meet with faculty. If desired, it is possible to audit a class or seminar session during your visit. 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.

## Doctor of Education: Applied Physiology

The goal of the Doctor of Education with specialization in Applied Physiology is to prepare doctoral students to pursue scholarly and scientific work. Students are expected to contribute significantly to the completion of at least one comprehensive research project prior to initiation of their dissertation proposal. The skills developed during completion of this project will enable students to carry out their dissertation projects independently. Students are encouraged to present the work leading up to the dissertation proposal at national meetings and to contribute to the publication of results in peer-reviewed journals. Research may be completed in the applied physiology laboratories at Teachers College or in another clinical/research setting. If the work is completed outside of Teachers College, students are expected to work closely with their advisor and demonstrate that they have contributed significantly to the completion of the required projects. All work (either at Teachers College or outside of the College) must be developed and completed in close conjunction with advisement of Applied Physiology Program faculty. The

preliminary work may be published prior to graduation, but the final study may only be published upon completion of the degree. All Ed.D. students are encouraged to write a grant to obtain pre-doctoral fellowship funding to support their research and to provide some training in grantsmanship.

### **Admission**

*Applicants are expected to satisfy the following requirements for admission:*

1. Prior completion of both a bachelor's and master's degree program (with a major in movement sciences or closely related field at either or both levels). Students who have deficiencies but who are otherwise qualified are encouraged to apply to the Masters of Education Program to complete deficiencies.
2. A record of superior academic achievement as evidenced by the grades received in undergraduate and graduate course work.
3. Letters of recommendation from persons familiar with the candidate's academic and professional achievements should attest to the applicant's capability for successful doctoral study.
4. The applicant's written personal statement (accompanying the application) should provide evidence of the ability to communicate effectively in writing and should provide an initial indication that the program is compatible with his or her professional goals. A key part of the admissions process is a research interest compatible with a faculty member in the Movement Sciences.
5. Each applicant should submit one additional writing sample, such as a term paper, thesis, or published article, so that academic writing skills can be assessed. In cases where a thesis is in progress, a research proposal may be acceptable at the discretion of the faculty.
6. In most cases, an interview will be required to clarify any unresolved issues related to the applicant's qualifications and interests and to make certain that the area of study is compatible with the applicant's professional goals and that the area of research interest can be supported by a faculty member in Movement Sciences. In instances where applicants are a long distance from campus, telephone interviews, videoconferences, or interviews at professional meetings may be scheduled.

### **Advisement and Program Planning**

Prior to registration, newly admitted doctoral candidates meet individually with their faculty advisor to plan the initial phases of their programs. A tentative plan for the first year or two of study is developed—subject to change as the need arises. Part-time and full-time programs are arranged depending on the student's circumstances. At an early stage in the planning process, students develop a written plan for meeting program objectives that allows adequate time for graduate study during each semester of enrollment and provides for meeting all program requirements within a reasonable period of time. This plan, together with an official program plan, is filed with the Office of Doctoral Studies. Individual advisement meetings are scheduled frequently throughout the student's tenure in the program and may be initiated by either the student or faculty member. These meetings may be used to plan programs, provide feedback, review past work, deal with school related problems, discuss research, career planning, or discuss other issues.

For the doctoral program in Applied Physiology, specific course requirements (or equivalents transferred from previous graduate study) include

- 1) All coursework required for the Ed.M. degree, plus:
- 2) Registration in BBSR 5595 every semester in attendance (1 point)
- 3) Minimum of 15 points in Research Methods and Statistics
- 4) Minimum of 9 points in substantive study in movement sciences
- 5) Additional courses required to achieve research and career goals

### **Certification**

When students have completed approximately 60-65 of the total points required for the Ed.D. degree, they are evaluated for "certification," a stage of doctoral study which represents full candidacy for the degree. To achieve certification, the student must complete the certification examination, which is a written comprehensive examination covering the scientific literature on three areas related to the student's selected research specialization area, a literature review, and submit a plan for meeting total program objectives. A review committee assesses the student's entire record. The decision of the committee is then forwarded to the Teachers College Ed.D. Committee for final action on the candidate's certification.

### **Dissertation**

Each student completes a dissertation that focuses on a research question in applied physiology. Through course work, the research seminar, working as an apprentice in the research of faculty and more advanced students, and pilot studies, students develop the skills to complete the dissertation. Many types of questions and methodologies, appropriate to applied physiology research, may be employed in completing the dissertation. The dissertation research is expected to address a complex research problem and to be of sufficient quality to result in at least three publications to be published in a top journal.

Throughout the process, the student works closely with his or her advisor on the design and conduct of the doctoral dissertation. Thereafter the student works under the supervision of a dissertation committee until the dissertation is completed. Once the dissertation is successfully defended, it is expected that students will share what they have learned by presenting at professional meetings and publishing one or more articles.

### **Degree Policies**

Statement of satisfactory progress: Students are expected to make satisfactory progress toward the completion of degree requirements. Program faculty will annually review each student's progress. Please note that satisfactory performance in the applied physiology program is defined as no Incomplete grades and no BBSR or BBS courses in which the grade earned is lower than B. Doctoral students generally are expected to have grades of B or better in coursework in research methods, statistics, and cognate areas.

Where there are concerns about satisfactory progress, students will be informed by the program faculty. If a student is performing below expectations, he/she may be required to complete additional course work.

The program will provide a plan and timeline for remediation so students know the expectation for them to continue in the program. If satisfactory progress is not maintained, a student may be dismissed from the program.

## **Doctor of Education: Motor Learning and Control**

In the preparation of doctoral students, the goal is to develop those competencies necessary to pursue scholarly and scientific work and to formulate strategies to enhance professional practice.

Research training uses an apprenticeship model. Students work closely with faculty throughout their preparation: initially as apprentices with access to considerable advisement, subsequently as collaborators, then progressing to a position as independent researchers.

Typically, the dissertation research is an extension of one or two prior studies. Often, research leading up to the dissertation is presented at national meetings or is published in professional journals.

In addition to substantive study and research preparation, students are expected to design an individual program representing their research area and professional concerns. Such preparation requires a significant commitment to graduate study. Doctoral students (and Ed.M. students planning to pursue the doctoral degree) are required to be engaged in research at least three days per week (on or off-site) and be available for advisement at least two mornings or afternoons.

For the doctoral program with specialization in Motor Learning and Control, specific course requirements (or equivalents transferred from prior graduate study) are:

- BBS 5060 Neuromuscular responses and adaptation to exercise (2)
- BBS 5068 Brain and behavior I: Communication in the nervous system (1-2)
- BBSR 4050 Biomechanical analysis of human movement (3)
- BBSR 4060 Motor learning (3)
- BBSR 4151 Laboratory methods in biomechanics (3)
- BBSR 4161 Motor learning laboratory (2-3)
- BBSR 5151 Introduction to the analysis of biomechanical signals, or an approved course in computer programming (3)
- BBSR 5504 Research training in motor learning (2-3 points each semester, continuous enrollment required until completion of degree requirements, typically 18 points)
- BBSR 5582 Research design in the movement sciences (3)
- Four courses (12 points) selected from: BBSQ 4047, BBSR 4055, BBSR 4070, BBSR 4865, MSTC 5000, BBSR 5050, BBSR 5028, BBSR 5055, BBSR 5057, BBSR 5251, BBSR 5860
- Three topical seminars (9 points) selected from: BBSR 5596, BBSR 6563, BBSR 6564, BBSR 6565
- Statistics sequence minimum (9 points): HUDM 4122, HUDM 5122 and HUDM 5123

Two courses in educationally-relevant areas must also be selected from the list below or substituted with advisor permission:

- C&T 4004 Basic course in school improvement (3)
- C&T 4052 Designing curriculum and instruction (3)
- C&T 4078 Curriculum and teaching in urban areas (3)
- C&T 4114 Multicultural approaches to teaching young children (3)
- C&T 4159 Teacher education programs (3)
- C&T 5020 The environments of school (3)
- ORLH 4010 Purposes and policies of higher education (3)
- ORLH 4011 Curriculum and instruction in higher education (3)
- ORLH 4040 The American college student (3)
- ORLH 4820 Cultural diversity training in higher education settings: Issues and concerns (3)
- ORLH 4830 Transforming the curriculum: Theory and practice (3)
- Individual program and electives (17)

Teaching Assistantships: Program faculty believe strongly in the value of assistant teaching. Teaching assistantship can provide students with valuable opportunities to learn new material, review material previously acquired and obtain teaching skills and materials. The objective of the required teaching assistantship is to provide Ed.D. students with a quality learning experience that will benefit them regardless of whether they pursue academic or nonacademic careers. Doctoral students are required to serve as a teaching assistant for one Masters level course before graduating (whether in a paid or non-paid capacity). Every effort will be made to match student preferences with available opportunities, but students should expect that they may not always receive their first preference. Beyond this, additional teaching assistantship opportunities may be available for more advanced courses.

Graduate Study/Clinical Practice Traineeships are available for occupational and physical therapists enrolled in or admitted to degree programs in Movement Science. They are offered in collaboration with several clinical agencies located in the metropolitan New York area that provide services to diverse groups including pediatric, adult, and geriatric clients. These traineeships involve up to 20 hours per week in a clinical setting and provide stipend and tuition benefits. International students may qualify, contingent on obtaining appropriate New York State clinical licensure. The latter may take up to 12 months so interested prospective students should contact the coordinator as soon as possible during the application process. The

instructional staff in Movement Science provides clinical supervision. A case study approach is used to directly bridge between substantive study and clinical practice. For more detailed information, contact the Coordinator of Clinical Traineeships at (212) 678-3325.

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## Doctor of Philosophy: Kinesiology

### Doctor of Philosophy (Ph.D.)

The Ph.D. program requires a full-time commitment to graduate studies. This entails engaging in coursework and research activity related to the doctoral degree at least five days per week. Ph.D. students should not expect to hold outside employment during their studies. This commitment will ensure that advisement, research activities, and course work can be completed to the degree of competence that is expected in a research-intensive degree program. The degree of Doctor of Philosophy emphasizes research and intensive specialization in a field of scholarship. Under an Agreement with Columbia University, Teachers College offers programs leading to the Ph.D. degree in designated fields in which the Graduate School of Arts and Sciences of the University does not offer programs, namely in education, including education in the substantive disciplines and certain applied areas of psychology and physiology. The minimum requirements for the degree are: satisfactory completion of a planned program of 75 graduate points beyond the Baccalaureate; submission of a statement of total program indicating periods of intensive study subsequent to the first year of graduate study which accompanies the program plan of study; satisfactory performance on foreign language examinations and on a departmental Certification Examination; and preparation and defense of a research dissertation. In addition, doctoral students in Kinesiology are expected to complete a sequence of three research studies, or the equivalent, to meet degree requirements. Relevant courses completed in other recognized graduate schools to a maximum of 30 points, or 45 points if completed in another Faculty of Columbia University, may be accepted toward the minimum point requirement for the degree. Each degree candidate must satisfy departmental requirements for the award of the Ed.M. degree prior to continuance in the Ph.D. program. These degree requirements are specified in the Requirements for the Degree of Doctor of Philosophy Bulletin, obtainable from the Office of Doctoral Studies. Each student and his or her advisor develop a program that will help the student meet his or her goals and successfully complete the series of studies that meets the research requirements of the program.

For more information about special application requirements, program description and degree program requirements for the Ph.D. program in Kinesiology, contact Professor Gordon at [msnsprogram@tc.edu](mailto:msnsprogram@tc.edu)



## Application Information

While students come from a variety of fields, the following backgrounds are most appropriate: kinesiology, movement sciences, exercise science, physical therapy, occupational therapy, physical education, athletic training, biology, nutrition, nursing, health education, public health, and psychology. Students with strong academic records who have deficiencies in their science backgrounds, may be admitted on a provisional basis with the understanding that these deficiencies will be remedied with appropriate courses taken *in addition to* those required for the MA degree. It is strongly recommended that students without undergraduate coursework in anatomy and physiology (usually a two-semester sequence with laboratory) or exercise physiology take these courses or their equivalent prior to entering the program.

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 to meet with faculty. If desired, it may be possible to audit a class or seminar session during your visit. 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.

## Financial Aid

Graduate Study/Clinical Practice Traineeships may be available for occupational and physical therapists enrolled in or admitted to degree programs in Movement Sciences and Education/Kinesiology. They are offered in collaboration with several clinical agencies located in the metropolitan New York area that provide services to diverse groups including pediatric, adult and geriatric clients.

Depending on the number of hours, these traineeships typically carry an award of \$30,000-\$35,000 in stipend and tuition benefits. The instructional staff in Movement Sciences provides clinical supervision. A case study approach is used to directly bridge between substantive study and clinical practice. International students may qualify, contingent on obtaining appropriate clinical licensure.

In addition to scholarship awards, advanced students in the Ed.M., Ed.D., or Ph.D. programs may have an opportunity for funding by serving as research, laboratory or teaching assistants, or through appointment as instructors in basic courses. Work study positions are also available to U.S. citizens and permanent residents who have applied for and received work study allocations. For more information, contact the Teachers College Office of Financial Aid (<http://www.tc.columbia.edu/financialaid/>).

# Faculty List

## Faculty

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## Course List

### **BBS 4032 NEUROSCIENCE OF HUMAN SPEECH AND LANGUAGE**

An introduction to the neurological bases of normal speech and language perception, production and use.

### **BBS 5060 NEUROMUSCULAR RESPONSES AND ADAPTATION TO EXERCISE**

A review of the physiology of muscle contraction in addition to in-depth discussion of topics related to the field which include: the relationship between muscle activation and respiration during exercise, muscle fatigue, eccentric versus concentric contractions and adaptation to strength training.

### **BBS 5068 BRAIN AND BEHAVIOR I: COMMUNICATION IN THE NERVOUS SYSTEM**

An introduction to communication within the nervous system and functional brain neuroanatomy. Examination of chemical circuits in the brain and associated pathologies, such as Parkinson's disease, Tourettes, schizophrenia, depression, and anxiety.

### **BBS 5069 BRAIN AND BEHAVIOR II: PERCEPTION, EMOTION, MEMORY AND COGNITION**

An introduction to brain processes associated with perception, emotion, memory and cognition. Consequences of damage to these neurobehavioral processes are examined through reading and discussion of clinical case studies.

### **BBSR 4005 APPLIED ANATOMY AND BIOMECHANICS**

Topics include: gross anatomy and function of human skeletal and muscular systems, mechanics of human movement, and analysis of skills in dance and physical education. Designed primarily for students without a prior course in anatomy or biomechanics. Students will be expected to participate in a laboratory offered immediately preceding the scheduled class time. Lab fee: \$50.

### **BBSR 4050 BIOMECHANICAL ANALYSIS OF HUMAN MOVEMENT**

Permission required. Covers the principles and techniques required to analyze human movement, which can be used to develop practical research questions. Quantitative and qualitative techniques for analysis of movement are discussed in relation to the study of learning, motor control, motor development, and motor impairments. Lab fee: \$50.

### **BBSR 4060 MOTOR LEARNING**

Study of factors relating to the acquisition and performance of motor skills. Includes review and analysis of appropriate research findings.

### **BBSR 4070 INTRODUCTION TO THE PSYCHO-SOCIAL STUDY OF HUMAN MOVEMENT**

A general overview of knowledge and theory pertaining to the psychosocial dynamics of behavior in sports and dance.

### **BBSR 4090 PHYSICAL FITNESS, WEIGHT CONTROL, AND RELAXATION**

Contributions of exercise to human well-being throughout life. Classroom, gymnasium, and laboratory experiences included. Designed for teachers, counselors, and others who desire an introduction to basic concepts of physical fitness.

### **BBSR 4095 APPLIED PHYSIOLOGY I**

Prerequisite: a course in human physiology. Physiological bases of exercise. Lectures concerning the effects of exercise on the major physiological systems (cellular, cardiovascular, thermoregulatory, pulmonary, renal, body fluids, hormonal).

**BBSR 4151 LABORATORY METHODS IN BIOMECHANICS**

Permission required. Enrollment limited. Prerequisite: BBSR 4050. Students develop technical skills in the application of biomechanics to the study of movement behavior including video-based data collection and computer-based kinematic analysis. Students design and conduct a pilot research study using biomechanical analysis of a functional movement. Special fee: \$75.

**BBSR 4161 MOTOR LEARNING LABORATORY**

An introduction to qualitative and quantitative analysis of movement and action during acquisition of functional skills. Corequisite: BBSR 4060.

**BBSR 4861 WORKSHOP IN MOTOR LEARNING AND CONTROL**

Students carry out a case study of skill acquisition in a functional movement task and integrate qualitative and quantitative findings in a final essay, characterizing the learning process.

**BBSR 4900 RESEARCH AND INDEPENDENT STUDY IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. Master's degree students undertake research and independent study under the direction of a faculty member.

**BBSR 5028 MOTOR DEVELOPMENT ACROSS THE LIFESPAN**

Review and analysis of theoretical models and experimental research related to development and performance of motor skills throughout the lifespan.

**BBSR 5050 NEUROPHYSIOLOGY OF MOTOR CONTROL AND ELECTROMYOGRAPHY**

Review and analysis of theoretical models and experimental research related to development and performance of motor skills throughout the lifespan. Advanced topics dealing with the experimental and clinical use of electromyography. Topics will be integrated with the kinematics of movements being observed. A laboratory project using EMG will be required. Lab fee: \$50.

**BBSR 5055 BASES OF MOTOR CONTROL SYSTEMS**

Study of control processes subserving the coordination of movement.

**BBSR 5095 EXERCISE AND HEALTH**

The role of exercise in diagnosis, prevention, and rehabilitation of health problems such as cardiovascular disease, pulmonary disease, diabetes, obesity, and stress. Scientific evidence from both epidemiological and applied practice perspectives are emphasized.

**BBSR 5151 INTRODUCTION TO THE ANALYSIS OF BIOMECHANICAL SIGNALS**

Introduction to the concepts and techniques used in the analysis of biomechanical signals. Students will apply these techniques to actual kinematic, kinetic and electromyographic data using the Lab- VIEW programming language.

**BBSR 5194 APPLIED PHYSIOLOGY LABORATORY II**

The discussion and practice of techniques for collection and analysis of physiologic data (strength testing, electromyography, computerized data acquisition). Lab fee: \$100.

**BBSR 5195 ADVANCED APPLIED PHYSIOLOGY LABORATORY**

Prerequisite: BBSR 5194. Introduction of advanced physiologic measurement techniques and concepts. Included are indirect calorimetry, spectrophotometry, vascular volume dynamics, autonomic reflexes, thermoregulation, noninvasive cardiac output, computer data plethysmography, tonometry, acquisition, and post-acquisition analyses. Lab fee: \$100.

**BBSR 5200 FIELDWORK IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. For advanced students prepared to investigate problems.

**BBSR 5251 FIELDWORK SEMINAR IN MOTOR LEARNING AND MOTOR CONTROL**

Applications of theory/research to therapeutic or educational practice for students in field-based settings.

**BBSR 5504 RESEARCH TRAINING IN MOTOR LEARNING**

Permission required. A competency-based approach to the preparation of researchers in the areas of neuromotor control and perceptual-motor processes. Several learning experiences are offered each semester, involving lectures, laboratory practica, seminars and individual research advisement.

**BBSR 5582 RESEARCH DESIGN IN MOVEMENT SCIENCE AND EDUCATION**

Basic concepts of research design and statistical analysis. Students learn to interpret articles and design projects.

**BBSR 5595 RESEARCH SEMINAR IN APPLIED PHYSIOLOGY**

M.A. students carrying out research-culminating projects enroll in this course near the end of their course of study to discuss and present their projects. Ed.M. and doctoral students enroll at least once in connection with each research project they complete.

**BBSR 6201 SUPERVISION OF EDUCATIONAL OR CLINICAL PRACTICE IN THE MOVEMENT SCIENCES**

Permission required. Corequisite: Actual supervisory experience during that semester. For doctoral students in the movement sciences. Field-based experiences in the guidance of therapists or educators engaged in applying the movement sciences to clinical practice.

**BBSR 6563 NEUROMOTOR PROCESSES SEMINAR**

Offered in conjunction with review and analysis of research related to conference topic.

**BBSR 6564 ADVANCED TOPICS IN NEUROMOTOR PROCESSES**

Topic changes annually.

**BBSR 6900 SUPERVISED INDEPENDENT RESEARCH IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. For advanced students who wish to conduct research under faculty guidance.

**BBSR 7500 DISSERTATION SEMINAR IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. Candidate develops proposal for doctoral dissertation in consultation with advisor. Seminar convenes only on days when candidates present proposals for approval.

**BBSR 8900 DISSERTATION ADVISEMENT IN MOVEMENT SCIENCE AND EDUCATION**

Individual advisement on doctoral dissertations. Fee to equal 3 points at current tuition rate for each term. For requirements, see section in catalog on Continuous Registration for Ed.D./Ph.D. degrees.

# Curriculum and Teaching in Physical Education

Department of - Biobehavioral Science

## Contact Information

**Phone:** (212) 678-3325

**Fax:** (212) 678-3322

**Email:** [msnsprogram@tc.edu](mailto:msnsprogram@tc.edu)

**Director:** Professors Andrew Gordon, Carol Ewing Garber, Stephen Silverman

## Program Description

### Curriculum and Teaching in Physical Education (PECT)

Master of Arts (M.A.)

Master of Education (Ed.M.)

Doctor of Education (Ed.D.)

## Degree Summary

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

## Degree Requirements

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### Master of Arts (M.A., 32-point)

The specific career goals of the student are used in planning the graduate program. Programs include one or more of the following features:

#### *Field-Based Experiences*

The theoretical study of curriculum and teaching concepts is integrated with field-based applications of those concepts. Part of the student's graduate study experience takes place in elementary, secondary, or college physical education settings. Students who are concurrently employed as physical education teachers use their own schools as field sites; other students are assigned to selected field sites.

#### *Program Design and Development*

Students critically examine an array of traditional and innovative physical education program designs, and then formulate their own conception of curriculum. Program evaluation techniques are studied and then used to conduct field evaluations of ongoing programs. Students learn systematic techniques for program development and use them to plan programs for field settings.

#### *Teaching: Performance and Analysis*

Students critically evaluate existing theories and models of teaching, and devise their own concepts of teaching. A spectrum of analytic techniques is used to analyze videotaped and live samples of interactive teaching.

#### *Study and Application of Concepts of Human Movement and Health*

Students study theory and research in the applied sciences of anatomy, movement analysis, exercise physiology, health, nutrition, motor learning, and their applications to program designs and teaching strategies.

#### *Culminating Experience*

Students in the M.A. and Ed.M. programs are required to complete a culminating experience that integrates material from their course-work. This experience can be field-based, theoretical, or a research project related to physical education. The student and his or her advisor will discuss and design an individual experience that helps meet the goals of the student's program.

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### Master of Education (Ed.M., 60-point)

The specific career goals of the student are used in planning the graduate program. Programs include one or more of the following features:

#### *Field-Based Experiences*

The theoretical study of curriculum and teaching concepts is integrated with field-based applications of those concepts. Part of the student's graduate study experience takes place in elementary, secondary, or college physical education settings. Students who are concurrently employed as physical education teachers use their own schools as field sites; other students are assigned to selected field sites.

#### *Program Design and Development*

Students critically examine an array of traditional and innovative physical education program designs, and then formulate their own conception of curriculum. Program evaluation techniques are studied and then used to conduct field evaluations of ongoing programs. Students learn systematic techniques for program development and use them to plan programs for field settings.

*Teaching: Performance and Analysis*

Students critically evaluate existing theories and models of teaching, and devise their own concepts of teaching. A spectrum of analytic techniques is used to analyze videotaped and live samples of interactive teaching.

*Study and Application of Concepts of Human Movement and Health*

Students study theory and research in the applied sciences of anatomy, movement analysis, exercise physiology, health, nutrition, motor learning, and their applications to program designs and teaching strategies.

*Culminating Experience*

Students in the M.A. and Ed.M. programs are required to complete a culminating experience that integrates material from their coursework. This experience can be field-based, theoretical, or a research project related to physical education. The student and his or her advisor will discuss and design an individual experience that helps meet the goals of the student's program.

## Doctor of Education (Ed.D., 90-point)

The specific career goals of the student are used in planning the graduate program. Programs include one or more of the following features:

*Field-Based Experiences*

The theoretical study of curriculum and teaching concepts is integrated with field-based applications of those concepts. Part of the student's graduate study experience takes place in elementary, secondary, or college physical education settings. Students who are concurrently employed as physical education teachers use their own schools as field sites; other students are assigned to selected field sites.

*Program Design and Development*

Students critically examine an array of traditional and innovative physical education program designs, and then formulate their own conception of curriculum. Program evaluation techniques are studied and then used to conduct field evaluations of ongoing programs. Students learn systematic techniques for program development and use them to plan programs for field settings.

*Teaching: Performance and Analysis*

Students critically evaluate existing theories and models of teaching, and devise their own concepts of teaching. A spectrum of analytic techniques is used to analyze videotaped and live samples of interactive teaching.

*Study and Application of Concepts of Human Movement and Health*

Students study theory and research in the applied sciences of anatomy, movement analysis, exercise physiology, health, nutrition, motor learning, and their applications to program designs and teaching strategies.

*Research Competence (for Ed.D. students)*



All doctoral students develop proficiency in research and complete a dissertation under the advisement of a faculty sponsor. With their career goals in mind, students design their programs to include coursework that focuses on research methods and the results of research in physical education, and participate in research experiences to demonstrate competence and successfully complete the dissertation.

All doctoral students participate in an intensive seminar that reviews research in physical education and also attend a continuous research semester during most semesters of their enrollment in the program. Students must satisfactorily complete all parts of the program certification exam and a literature review to be certified and officially begin the dissertation process.

During the dissertation process, students work closely with an advisor and complete pilot studies to enhance their research skills. Students who are planning on academic careers that will include conducting research may participate in faculty research projects throughout their program to further enhance their research preparation.

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## Course List

### **BBS 4032 NEUROSCIENCE OF HUMAN SPEECH AND LANGUAGE**

An introduction to the neurological bases of normal speech and language perception, production and use.

### **BBS 5060 NEUROMUSCULAR RESPONSES AND ADAPTATION TO EXERCISE**

A review of the physiology of muscle contraction in addition to in-depth discussion of topics related to the field which include: the relationship between muscle activation and respiration during exercise, muscle fatigue, eccentric versus concentric contractions and adaptation to strength training.

### **BBS 5068 BRAIN AND BEHAVIOR I: COMMUNICATION IN THE NERVOUS SYSTEM**

An introduction to communication within the nervous system and functional brain neuroanatomy. Examination of chemical circuits in the brain and associated pathologies, such as Parkinson's disease, Tourettes, schizophrenia, depression, and anxiety.

### **BBS 5069 BRAIN AND BEHAVIOR II: PERCEPTION, EMOTION, MEMORY AND COGNITION**

An introduction to brain processes associated with perception, emotion, memory and cognition. Consequences of damage to these neurobehavioral processes are examined through reading and discussion of clinical case studies.

### **BBSR 4005 APPLIED ANATOMY AND BIOMECHANICS**

Topics include: gross anatomy and function of human skeletal and muscular systems, mechanics of human movement, and analysis of skills in dance and physical education. Designed primarily for students without a prior course in anatomy or biomechanics. Students will be expected to participate in a laboratory offered immediately preceding the scheduled class time. Lab fee: \$50.

### **BBSR 4050 BIOMECHANICAL ANALYSIS OF HUMAN MOVEMENT**

Permission required. Covers the principles and techniques required to analyze human movement, which can be used to develop practical research questions. Quantitative and qualitative techniques for analysis of movement are discussed in relation to the study of learning, motor control, motor development, and motor impairments. Lab fee: \$50.

### **BBSR 4060 MOTOR LEARNING**

Study of factors relating to the acquisition and performance of motor skills. Includes review and analysis of appropriate research findings.

### **BBSR 4070 INTRODUCTION TO THE PSYCHO-SOCIAL STUDY OF HUMAN MOVEMENT**

A general overview of knowledge and theory pertaining to the psychosocial dynamics of behavior in sports and dance.

### **BBSR 4090 PHYSICAL FITNESS, WEIGHT CONTROL, AND RELAXATION**

Contributions of exercise to human well-being throughout life. Classroom, gymnasium, and laboratory experiences included. Designed for teachers, counselors, and others who desire an introduction to basic concepts of physical fitness.

### **BBSR 4095 APPLIED PHYSIOLOGY I**

Prerequisite: a course in human physiology. Physiological bases of exercise. Lectures concerning the effects of exercise on the major physiological systems (cellular, cardiovascular, thermoregulatory, pulmonary, renal, body fluids, hormonal).

**BBSR 4151 LABORATORY METHODS IN BIOMECHANICS**

Permission required. Enrollment limited. Prerequisite: BBSR 4050. Students develop technical skills in the application of biomechanics to the study of movement behavior including video-based data collection and computer-based kinematic analysis. Students design and conduct a pilot research study using biomechanical analysis of a functional movement. Special fee: \$75.

**BBSR 4161 MOTOR LEARNING LABORATORY**

An introduction to qualitative and quantitative analysis of movement and action during acquisition of functional skills. Corequisite: BBSR 4060.

**BBSR 4861 WORKSHOP IN MOTOR LEARNING AND CONTROL**

Students carry out a case study of skill acquisition in a functional movement task and integrate qualitative and quantitative findings in a final essay, characterizing the learning process.

**BBSR 4900 RESEARCH AND INDEPENDENT STUDY IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. Master's degree students undertake research and independent study under the direction of a faculty member.

**BBSR 5028 MOTOR DEVELOPMENT ACROSS THE LIFESPAN**

Review and analysis of theoretical models and experimental research related to development and performance of motor skills throughout the lifespan.

**BBSR 5050 NEUROPHYSIOLOGY OF MOTOR CONTROL AND ELECTROMYOGRAPHY**

Review and analysis of theoretical models and experimental research related to development and performance of motor skills throughout the lifespan. Advanced topics dealing with the experimental and clinical use of electromyography. Topics will be integrated with the kinematics of movements being observed. A laboratory project using EMG will be required. Lab fee: \$50.

**BBSR 5055 BASES OF MOTOR CONTROL SYSTEMS**

Study of control processes subserving the coordination of movement.

**BBSR 5095 EXERCISE AND HEALTH**

The role of exercise in diagnosis, prevention, and rehabilitation of health problems such as cardiovascular disease, pulmonary disease, diabetes, obesity, and stress. Scientific evidence from both epidemiological and applied practice perspectives are emphasized.

**BBSR 5151 INTRODUCTION TO THE ANALYSIS OF BIOMECHANICAL SIGNALS**

Introduction to the concepts and techniques used in the analysis of biomechanical signals. Students will apply these techniques to actual kinematic, kinetic and electromyographic data using the Lab- VIEW programming language.

**BBSR 5194 APPLIED PHYSIOLOGY LABORATORY II**

The discussion and practice of techniques for collection and analysis of physiologic data (strength testing, electromyography, computerized data acquisition). Lab fee: \$100.

**BBSR 5195 ADVANCED APPLIED PHYSIOLOGY LABORATORY**

Prerequisite: BBSR 5194. Introduction of advanced physiologic measurement techniques and concepts. Included are indirect calorimetry, spectrophotometry, vascular volume dynamics, autonomic reflexes, thermoregulation, noninvasive cardiac output, computer data plethysmography, tonometry, acquisition, and post-acquisition analyses. Lab fee: \$100.

**BBSR 5200 FIELDWORK IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. For advanced students prepared to investigate problems.

**BBSR 5251 FIELDWORK SEMINAR IN MOTOR LEARNING AND MOTOR CONTROL**

Applications of theory/research to therapeutic or educational practice for students in field-based settings.

**BBSR 5504 RESEARCH TRAINING IN MOTOR LEARNING**

Permission required. A competency-based approach to the preparation of researchers in the areas of neuromotor control and perceptual-motor processes. Several learning experiences are offered each semester, involving lectures, laboratory practica, seminars and individual research advisement.

**BBSR 5582 RESEARCH DESIGN IN MOVEMENT SCIENCE AND EDUCATION**

Basic concepts of research design and statistical analysis. Students learn to interpret articles and design projects.

**BBSR 5595 RESEARCH SEMINAR IN APPLIED PHYSIOLOGY**

M.A. students carrying out research-culminating projects enroll in this course near the end of their course of study to discuss and present their projects. Ed.M. and doctoral students enroll at least once in connection with each research project they complete.

**BBSR 6201 SUPERVISION OF EDUCATIONAL OR CLINICAL PRACTICE IN THE MOVEMENT SCIENCES**

Permission required. Corequisite: Actual supervisory experience during that semester. For doctoral students in the movement sciences. Field-based experiences in the guidance of therapists or educators engaged in applying the movement sciences to clinical practice.

**BBSR 6563 NEUROMOTOR PROCESSES SEMINAR**

Offered in conjunction with review and analysis of research related to conference topic.

**BBSR 6564 ADVANCED TOPICS IN NEUROMOTOR PROCESSES**

Topic changes annually.

**BBSR 6900 SUPERVISED INDEPENDENT RESEARCH IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. For advanced students who wish to conduct research under faculty guidance.

**BBSR 7500 DISSERTATION SEMINAR IN MOVEMENT SCIENCE AND EDUCATION**

Permission required. Candidate develops proposal for doctoral dissertation in consultation with advisor. Seminar convenes only on days when candidates present proposals for approval.

**BBSR 8900 DISSERTATION ADVISEMENT IN MOVEMENT SCIENCE AND EDUCATION**

Individual advisement on doctoral dissertations. Fee to equal 3 points at current tuition rate for each term. For requirements, see section in catalog on Continuous Registration for Ed.D./Ph.D. degrees.

# Neuroscience and Education

Department of - Biobehavioral Science

## Contact Information

**Phone:** (212) 678-3325

**Fax:** (212) 678-3322

**Email:** msnsprogram@tc.edu

**Director:** Professor Peter Gordon

## Program Description

Neuroscience and Education was the first graduate program in the country to focus on the educational and clinical implications of recent advances in understanding brain-behavior relationships. One objective of the multi-disciplinary program is to prepare a new kind of specialist: a professional with dual preparation able to bridge the gap between research underlying brain, cognition, and behavior, and the problems encountered in schools and other applied settings. A second objective is to provide rigorous training and relevant experiences that would allow students to further their knowledge and make links between neuroscience, cognition, education, and clinical practice. The M.S. program is intended for professionals and non-professionals alike who would like to acquire knowledge in fields related to neuroscience and to participate in ongoing research, educational, or clinical practice. Graduates from the program may continue in their respective areas of professional specialization, while others develop careers in research settings or apply to doctoral programs for further study.

## Degree Summary

Neuroscience and Education (NEUR)

- Master of Science (M.S.)

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

# Degree Requirements

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## Masters of Science (M.S.)

The program of study for the M.S. in Neuroscience and Education offers a systematic sequence of courses within the neurosciences.

- Basic courses provide a thorough introduction to the neural bases of behavior.
- Advanced courses explore implications of brain-behavior research for educational and clinical practice.
- Supervised practica enable students to engage in ongoing research projects in neuroscience-related fields or to be involved in neuropsychological assessments and interventions.

Course Requirements:

### *Psychological processes underlying development, learning, and cognition.*

At least one course is required of the areas of developmental psychology and cognitive psychology. Possible courses fulfilling these requirements are listed below, but other courses in these areas or courses taken previously are also acceptable.

#### Developmental Psychology

- HUDK 4021 Developmental psychology: Infancy (2-3)
- HUDK 4022 Developmental psychology: Childhood (2-3)
- HUDK 4023 Developmental psychology: Adolescence (2-3)
- HUDK 4024 Developmental psychology: Adulthood and the lifespan (2-3)
- HUDK 4027 Development of mathematical thinking
- HUDK 5023 Cognitive development (3)
- HUDK 5024 Language development (2-3)

#### Learning and Cognition

- HBSK 5096 Psychology of memory
- HUDK 4015 Psychology of thinking
- HUDK 4029 Human cognition and learning
- HUDK 4080 Educational psychology
- HUDK 4820 Education for thinking
- HUDK 5025 Spatial thinking

### *Psychological Evaluation and Assessment*

Two courses in statistics, measurement, or assessment are required. These could include the following:

- BBSR 5582 Research design in the movement sciences (recommended for Neuroscience Students)
- HUDM 4050 Introduction to measurement (2-3)
- HUDM 4120 Basic concepts in statistics (3)
- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)
- HUDM 5124 Multidimensional scaling and clustering (3)

### *Educational or Clinical Specialization*

A set of courses representing a cohesive sequence of study in such areas as: audiology, counseling psychology, educational psychology, math education, motor learning, advanced neuroscience, science education, speech pathology or special education.

### **Neurobiological Bases of Behavior and Educational Applications**

#### *Core Courses*

The courses indicated below are for students with little or no prior background in neuroscience. With consultation and approval of the advisor, three to four courses are required unless equivalent preparation can be demonstrated.

- BBS 4032 Neuroscience of human speech and language (2)
- BBS 5068 Brain and behavior I: Communication in the nervous system (1-2)
- BBS 5069 Brain and behavior II: Perception, emotion, memory, and cognition (1-2)
- BBSQ 4040 Speech and language disorders (3)
- BBSN 5070 Neural bases for language and cognitive development (3)
- Topics courses offered in developmental psychology (1-3)

#### *Advanced Courses in Neuroscience*

Such courses may count toward the Clinical and Educational Specialization component of the program. Students who wish to develop more advanced knowledge within the neurosciences may register for up to 12 points of advanced courses in neuroscience offered outside of TC at Columbia University College of Physicians and Surgeons, and Faculty of Arts and Sciences.

#### *Seminars*

All students are required to register for the Integrative Seminar. In this seminar, students develop their ideas for the thesis topic, learn about research and practice, and develop presentations for Brain Awareness Week in the local schools:

- BBSN 5575 Integrative seminar in neurosciences and education (3)

#### *Practicum and Research Experience*

Students find placements in research or clinical settings either at TC or throughout the city in order to provide an experience that will become the basis for their thesis project. Students may register for research credit or independent study during this period. Teachers College and Columbia University offer courses to develop research skills in areas such as Brain Imaging. These include courses in the use of high-density EEG, which is offered as a summer workshop. A course in the use of fMRI in cognitive research is also available through the Neurological Institute of the Columbia Medical School. Both courses offer hands-on training with the relevant procedures.

#### *Master's Integrative Project*

Opportunities for student participation in research are available. Preparation of a master's integrative project is required for the degree. The integrative project involves either a research project, a practicum report, or an integrative review.



## Application Information

Applications will be considered throughout the year. Applications are available online by clicking on “Prospective Students” on the TC main website. GRE scores are not required but may be submitted by the applicant if available.

## Financial Aid

See the Office of Financial Aid (<http://www.tc.columbia.edu/financialaid/>) for more information.

# Faculty List

## Faculty

LISA A EDMONDS ([HTTP://TC.EDU/FACULTY/LE2269](http://tc.edu/faculty/LE2269))  
Associate Professor in Communication Sciences and Disorders

KAREN FROUD ([HTTP://TC.EDU/FACULTY/KF2119](http://tc.edu/faculty/KF2119))  
Associate Professor of Speech & Language Pathology

PETER GORDON ([HTTP://TC.EDU/FACULTY/PG328](http://tc.edu/faculty/PG328))  
Associate Professor of Neuroscience and Education

ANDREW MICHAEL GORDON  
([HTTP://TC.EDU/FACULTY/AG275](http://tc.edu/faculty/AG275))  
Professor of Movement Sciences

ERIKA SHIELD LEVY  
([HTTP://TC.EDU/FACULTY/EL2248](http://tc.edu/faculty/EL2248))  
Associate Professor in Communication Sciences and Disorders

KIMBERLY G NOBLE  
([HTTP://TC.EDU/FACULTY/KGN2106](http://tc.edu/faculty/KGN2106))  
Associate Professor of Neuroscience and Education

## Lecturers

ALISHA C. HOLLAND  
([HTTP://TC.EDU/FACULTY/AH3086](http://tc.edu/faculty/AH3086))

## Adjunct

ANLYS OLIVERA ([HTTP://TC.EDU/FACULTY/AO2412](http://tc.edu/faculty/AO2412))  
Adj Asst Prof of Neuroscience and Education

STEPHEN ALAN SANDS  
([HTTP://TC.EDU/FACULTY/SS2341](http://tc.edu/faculty/SS2341))  
Adjunct Associate Professor of Neuroscience

## Course List

### **BBS 4032 NEUROSCIENCE OF HUMAN SPEECH AND LANGUAGE**

An introduction to the neurological bases of normal speech and language perception, production and use.

### **BBS 5069 BRAIN AND BEHAVIOR II: PERCEPTION, EMOTION, MEMORY AND COGNITION**

An introduction to brain processes associated with perception, emotion, memory and cognition. Consequences of damage to these neurobehavioral processes are examined through reading and discussion of clinical case studies.

### **BBSN 5070 NEURAL BASES FOR LANGUAGE AND COGNITIVE DEVELOPMENT**

Examination of neural mechanisms involved in language, reading, and the acquisition of academic skills. Particular attention to language disorders, variations in cerebral organization, and hemisphere specialization.

### **BBSN 5575 INTEGRATIVE SEMINAR IN NEUROSCIENCE AND EDUCATION**

Primarily for students in the Neuroscience and Education program during preparation of the master's integrative project. Others by permission.

### **BBSQ 4040 SPEECH AND LANGUAGE DISORDERS**

Discussion of speech and language disorders and of remedial procedures. For speech pathology-audiology majors with-out academic background in speech and hearing and students in language arts, psychology, guidance, special education, childhood education, health education, nursing education, physical and occupational therapy, and dental hygiene.

# Communication Sciences and Disorders

Department of - Biobehavioral Science

## Contact Information

**Phone:** 212 678-3895

**Fax:** 212 678-8233

**Email:** [csd@tc.columbia.edu](mailto:csd@tc.columbia.edu)

**Director:** Professor Lisa Edmonds

## Program Description

The master's program in Communication Sciences and Disorders is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association.

The program in Communication Sciences and Disorders offers, advanced education and training in the processes of individual human communication (speech, hearing, language and upper aero-digestive disorders); disorders of human communication, and swallowing and remedial procedures for such disorders.

Emphases and interests of the program are reflected in the work of the following faculty: Professor O'Malley– psychoacoustics, including frequency selectivity, two-tone suppression, auditory spectral resolution, pitch, and auditory temporal acuity; Professor Saxman– speech and language development and disorder, vocal tract function and dysfunction and lifespan development of speech processes; Professor Levy– cross-language speech production and perception and second-language speech learning; Professor P. Gordon– language acquisition, psycholinguistics, cognitive development in infants and children; Professor Froud– acquired language pathology, neural correlates of normal and abnormal speech and language; Dr. Crowley– Bilingual Speech Language Pathology, and identifying critical factors that help distinguish between speech and language difference and disorders.

Programs leading to the M.S., Ed.D., and Ph.D. degrees in Speech-Language Pathology prepare graduates for positions in a variety of professional settings: school systems, community speech and hearing centers, rehabilitation centers, hospital clinics, private practice, state departments of education, health departments, federal agencies, and colleges and universities.

Because of the program's central concern with the processes of individual human communication, swallowing and their disorders and management, it has special interests in, and relations with, the fields of psychology, linguistics, anatomy and physiology, acoustics, special education, medicine, and dentistry.

Many of the program's courses in normal and disordered speech and hearing, and upper aero-digestive processes contribute to professional preparation in speech and language arts, kindergarten through secondary school education, special education, remedial reading, psychology, and various health related professions, including physical therapy, occupational therapy, dental hygiene, nursing, and hospital administration.

## Degree Summary

COMMUNICATION SCIENCES AND DISORDERS (CSDR)

Master of Science (M.S.) ,Doctor of Education (Ed.D.), Doctor of Philosophy (Ph.D.)

COMMUNICATION SCIENCES AND DISORDERS-INITIAL CERTIFICATION (CSDR-INIT)

Master of Science (M.S.)

COMMUNICATION SCIENCES AND DISORDERS BILINGUAL OPTION-DUAL CERTIFICATION (CSDB-DUAL)

Master of Science (M.S.)

COMMUNICATION SCIENCES AND DISORDERS-PROFESSIONAL CERTIFICATION (CSDR-PROF)

Master of Science (M.S.)

BILINGUAL EXTENSION INSTITUTE (SPTB) CERTIFICATION

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

# Degree Requirements

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## Master of Science

### Master of Science

This degree program incorporates academic and practicum requirements for the American Speech-Language-Hearing Association's Certification of Clinical Competence (ASHA CCC-SLP) as well as departmental and college requirements. Students who complete the degree program are also eligible for New York State licensing in speech and language pathology. Students may also elect to apply for the Teacher of Students with Speech and Language Disabilities Certificate (TSSLD) and the extension in bilingual speech-language pathology. New York State Education Department (NYSED) has teacher certification requirements that are needed for program completion and graduation which are listed in the Office of Teacher Education section of the catalog.

The minimum number of points for completion of the Program in Communication Sciences and Disorders is approximately 50, including practicum courses. Students who have no previous applicable coursework in the field typically require 74 points to complete the requirements for graduation.

Students admitted to the program with undergraduate majors in speech and language pathology or with substantial prior coursework can expect to complete the program within two calendar years (four semesters and two summer sessions) of full-time study. Students admitted with little or no prior coursework can expect to complete the program in two and one-half calendar years of full-time study.

Additional information about required course work and clinical experiences can be found in our Program Student Handbook (<http://www.tc.columbia.edu/bbs/speech-language/index.asp?Id=Student+Handbook&Info=Student+Handbook>).

### Bilingual-Multicultural Program Focus

The Bilingual-Bicultural Program Focus is for students who wish to develop expertise in working with culturally and linguistically diverse children and adolescents with communication disorders. Following the Bilingual -Multicultural Program Focus will satisfy the coursework and field placement requirements for the bilingual extension to the New York State TSSLD. Under New York State Education Department regulations, the bilingual extension certificate is required to provide speech and language intervention for bilingual children and adolescents ages 3 through 21. This includes working in a school system in New York State as well as providing bilingual therapy in a private practice where funding comes from the New York City Department of Education.

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## Doctor of Education (Ed.D., 90 points)

This degree program leads to a professional doctorate in Speech-Language Pathology and is designed to prepare candidates for professional leadership in clinical, supervisory, and teaching activities. A minimum of 90 points must be completed. There is no language requirement. All doctoral candidates must complete a dissertation. For details concerning the doctoral programs, please consult the Office of Doctoral Studies' bulletins for additional information.

## Doctor of Philosophy (Ph.D.,75 points)

This program is designed for individuals primarily interested in research and teaching careers in Speech-Language Pathology. A minimum of 75 points must be completed. There is no language requirement. All doctoral candidates must complete a dissertation. For details concerning the doctoral programs, please consult the Office of Doctoral Studies' bulletins for additional information.

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## Continuing Professional Education

Each year the Communication Sciences and Disorders program offers courses, workshops, and special events designed for postgraduates and other practicing professionals in the field and related fields. Also, under the Alumni Audit Program, alumni may audit courses offered through the program. The Program in Communication Sciences and Disorders is approved as a continuing education sponsor by the Continuing Education Board of the American Speech-Language-Hearing Association.

# Application Information

Ideally, candidates should have a broad liberal arts background with concentration in the biological and behavioral sciences.

Students from diverse academic and experience backgrounds are routinely accepted into the program and encouraged to apply.

Applications for master's in Speech-Language Pathology are considered for admission regardless of specific certification of interest.

Foundation courses that provide information relating to normal speech, language and hearing processes; introductory level courses in speech, language, and hearing disorders; and appropriate related areas required for the master's program can be taken as a matriculated graduate student at Teachers College or at another accredited institution.

Students with undergraduate preparation in communication sciences and disorders typically have completed the foundation courses. Students who choose to take the foundation work at Teachers College should plan on extending their master's program as appropriate, usually one semester and a summer session.

Doctoral candidates should have completed a professional master's degree in communication sciences and disorders prior to matriculation. Under exceptional circumstances, students with a master's degree in a closely related field will be considered for admission. In addition to the regular admission requirements, doctoral applicants must also submit:

## Doctor of Education (Ed.D.)

At least one letter of recommendation specifically related to the applicant's professional ability and potential. Whenever possible, this should be from a licensed or certified speech and language pathologist or audiologist familiar with the applicant's area of specific interest. A paper, no more than five or six pages in length, describing a major clinical problem in need of investigation or clarification in the applicant's area of interest may also be submitted.

## Doctor of Philosophy (Ph.D.)

If possible, at least one letter of recommendation related to the applicant's research potential by a professional familiar with the applicant's interests and aptitudes. A paper, not more than 5 or 6 pages in length, describing a major research need in the applicant's area of interest. Completion of at least 90 points in liberal arts courses.

## All Doctoral Applicants

Doctoral applicants are strongly urged to discuss their plans with one of the department's faculty before completing the application process. After all credentials have been received in the Admission Office, an interview will be arranged by the Department's Doctoral Admission and Monitoring Committee.

# Financial Aid

## College Financial Aid Information

Please see the Office of Financial Aid (<http://www.tc.columbia.edu/financialaid/>) for more information.

## **Additional funding: NYCDOE Tuition Scholarship:**

Students may also apply for tuition scholarship offered by the New York City Department of Education. The NYCDOE requires that for every year a student is in the master's program, they work two years in NYCDOE



schools. In the past, NYCDOE has been more inclined to award this scholarship to students who were interested in making the NYCDOE their career choice. Students apply directly to the NYCDOE.

Visit: [http://www.teachnycprograms.net/getpage.php?page\\_id=67](http://www.teachnycprograms.net/getpage.php?page_id=67)  
([http://www.teachnycprograms.net/getpage.php?page\\_id=67](http://www.teachnycprograms.net/getpage.php?page_id=67))

# Faculty List

## Faculty

CATHERINE J CROWLEY

([HTTP://TC.EDU/FACULTY/CJC49](http://tc.edu/faculty/CJC49))

Professor of Practice

LISA A EDMONDS ([HTTP://TC.EDU/FACULTY/LE2269](http://tc.edu/faculty/LE2269))

Associate Professor in Communication Sciences and Disorders

CAROL J HAMMER

([HTTP://TC.EDU/FACULTY/CJH2207](http://tc.edu/faculty/CJH2207))

Professor of Communication Sciences and Disorders

ERIKA SHIELD LEVY

([HTTP://TC.EDU/FACULTY/EL2248](http://tc.edu/faculty/EL2248))

Associate Professor in Communication Sciences and Disorders

MICHELLE S TROCHE

([HTTP://TC.EDU/FACULTY/MST2139](http://tc.edu/faculty/MST2139))

Assistant Professor in Communication Sciences and Disorders

KATHLEEN MARIE YOUSE

([HTTP://TC.EDU/FACULTY/KMY2105](http://tc.edu/faculty/KMY2105))

Assistant Professor of Practice

## Lecturers

JO ANN NICHOLAS

([HTTP://TC.EDU/FACULTY/JAN2103](http://tc.edu/faculty/JAN2103))

Lecturer

## Adjunct

KARIN B WEXLER ([HTTP://TC.EDU/FACULTY/KBW11](http://tc.edu/faculty/KBW11))

Adjunct Associate Professor of Speech & Language Pathology

## Instructors

MIRIAM BAIGORRI

([HTTP://TC.EDU/FACULTY/MB2198](http://tc.edu/faculty/MB2198))

BERNADINE RAE GAGNON

([HTTP://TC.EDU/FACULTY/BRG15](http://tc.edu/faculty/BRG15))

LINDSAY RACHEL MILGRAM

([HTTP://TC.EDU/FACULTY/LRF2109](http://tc.edu/faculty/LRF2109))

ELISE M WAGNER

([HTTP://TC.EDU/FACULTY/EMW2111](http://tc.edu/faculty/EMW2111))

## Course List

### **BBSQ 4030 SPEECH SCIENCE**

This course presents a kinesiological approach to the study of phonetics and the phonetics of physiologic impairment. Includes practice in use of the International Phonetic Alphabet and other descriptive systems.

### **BBSQ 4031 ANATOMY AND PHYSIOLOGY FOR SPEECH, LANGUAGE, AND HEARING**

This course teaches the basic structures and functions of the articulatory, vocal, respiratory, and nervous systems and applies this information to the field of speech-language pathology and audiology.

### **BBSQ 4040 SPEECH AND LANGUAGE DISORDERS**

Discussion of speech and language disorders and of remedial procedures. For speech pathology-audiology majors with-out academic background in speech and hearing and students in language arts, psychology, guidance, special education, childhood education, health education, nursing education, physical and occupational therapy, and dental hygiene.

### **BBSQ 4042 AUDIOLOGY**

This course covers acoustics, anatomy, and physiology of the auditory system, pure tone and speech audiometry, types and communication effects of hearing loss, amplification, and immitance.

### **BBSQ 4046 INTRODUCTION TO AUGMENTATIVE AND ALTERNATIVE COMMUNICATION**

This introductory course will provide a comprehensive overview of Augmentative and Alternative Communication (AAC). A thorough examination of the assessment and therapeutic processes will be presented. Emphasis will be placed upon individuals exhibiting severe communication disorders secondary to congenital/acquired cognitive and motor impairments. Low- and high-tech AAC systems will be discussed and demonstrated.

### **BBSQ 4047 EARLY MOTOR BEHAVIORS IN CHILDREN: NORMAL AND ABNORMAL**

Study of normal and abnormal development of sensory-motor speech processes and related oral motor behaviors; etiology, diagnosis, and management of pre-speech and eating pathologies in infants and severely handicapped individuals from an early intervention perspective.

### **BBSQ 5041 SCHOOL SPEECH-LANGUAGE-HEARING PROGRAMS**

Analyzes the impact of federal and state laws on service delivery in school setting. Develops skills to meet the needs of students with communication-disorders with the full range of disabilities, including working with other professionals to assist children in accessing the general curriculum.

### **BBSQ 5044 SPEECH AND LANGUAGE PERCEPTION AND PROCESSING**

*CSD Majors take course for 2 points only.* Examination of the models proposed to explain speech perception and discussion of the research that assigns a special role to speech and language.

### **BBSQ 5111 ASSESSMENT AND EVALUATION**

*Prerequisites: A course in normal language development and a course in Language Disorders in Children.* Studies use of published tests, technology, and alternative and curriculum-based strategies in assessment. Focuses on the impact of bilingualism and sociolinguistics on the assessment of culturally and linguistically diverse clients across the lifespan, covering the full range of disabilities.

**BBSQ 5112 ARTICULATION DISORDERS**

*Prerequisites: Phonetics course.* Study of phonological rule disorders and disorders associated with functional and various structural and neurological problems. Critical analysis of research in etiology, testing, and therapy.

**BBSQ 5113 VOICE DISORDERS**

*Prerequisite: BBSQ 4031 or equivalent.* Study of voice disorders associated with functional, structural, endocrinological, and neurological problems. Analysis of recent research and evidence-based approaches to voice therapy.

**BBSQ 5114 STUTTERING AND OTHER FLUENCY DISORDERS**

This course examines the nature of stuttering and other fluency disorders across the lifespan. Emphasis is placed on assessment, intervention, and prevention.

**BBSQ 5115 LANGUAGE DISORDERS IN CHILDREN**

*Prerequisite: A course in normal language development.* Language disorders in children, including native English speakers and children from culturally and linguistically diverse homes, covering the full range of disabilities. Course covers birth through late adolescence and includes impact of language disorders on language acquisition, literacy development, and uses of technology.

**BBSQ 5116 LANGUAGE DISORDERS IN ADULTS**

*Prerequisite: BBS 4032 Neuroscience or equivalent.* Theoretical and practical approaches to understanding the etiology, assessment, classification, and treatment of aphasia and other communication disorders in adulthood.

**BBSQ 5118 CLEFT PALATE AND SPEECH HABILITATION**

Etiology and symptomatology of the communication impairment associated with cleft lip and palate and other craniofacial disorders. The role of the speech pathologist in the multidisciplinary approach to total habilitation of children and adults.

**BBSQ 5119 ALARYNGEAL SPEECH**

Survey of medical and surgical treatments for laryngeal carcinoma. Analysis of physiologic, acoustic, and psychosocial aspects of alaryngeal speech. Study of therapeutic methods.

**BBSQ 5120 COMMUNICATION DISORDERS IN BILINGUAL/BICULTURAL CHILDREN**

Study of effect of bilingualism, bilingual education, sociolinguistics, psycholinguistics and multicultural perspectives in education on the communication-disordered child. Considers appropriate assessment and treatment to ensure optimal academic success for English Language Learners, bidialectal, and bicultural children with communication disorders, covering the full range of disabilities.

**BBSQ 5125 CLINICAL APPROACHES TO AURAL HABILITATION OF CHILDREN**

*Prerequisite: BBSQ 4042 Audiology or equivalent.* This class examines clinical procedures available to audiologists, speech pathologists, and deaf educators for implementing speech-reading, auditory training, and speech-language therapy for the hard-of-hearing child. Use of amplification and counseling approaches.

**BBSQ 5129 AUDIOLOGICAL CONCEPTS AND PRINCIPLES**

*Prerequisite: BBSQ 4042 Audiology or equivalent.* This course covers auditory pathologies, electrophysiological (ABR), and electroacoustical (OAE) tests. Tests of central auditory function, controversial issues in audition.

### **BBSQ 5130 ASSESSMENT AND INTERVENTION IN DYSPHAGIA**

This class examines clinical practice in swallowing and feeding disorders in children and adults. Normal and abnormal development and mature function assessment and treatment.

### **BBSQ 5210 PRACTICUM IN SCHOOL SPEECH-LANGUAGE PATHOLOGY**

Participation and student teaching in a school remedial speech and hearing program: survey, organization, remedial procedures. Special fee: \$150.

### **BBSQ 5212 PRACTICUM IN SCHOOL SPEECH-LANGUAGE PATHOLOGY (SUMMER)**

Participation and student teaching in a school remedial speech and hearing program: survey, organization, remedial procedures. Special fee: \$150.

### **BBSQ 5312 DIAGNOSTIC METHODS AND PRACTICE IN SPEECH-LANGUAGE PATHOLOGY**

*Prerequisite: BBSQ 5111 Assessment and evaluation.* Methods of assessing native English speakers and culturally and linguistically diverse clients, including English Language Learners. Methods of assessing clients within the full range of disabilities and across the lifespan. Special fee: \$150.

### **BBSQ 5331 THERAPY PRACTICUM**

Assessment and intervention planning and implementation for clients across the full range of disabilities and across the lifespan. Observation and practice in speech and language therapy at the Edward D. Mysak Clinic for Communication Disorders and at related field facilities. Majors enroll until practicum requirements for the M.S. degree are completed.

### **BBSQ 5332 THERAPY PRACTICUM: REGULAR CLINIC**

Assessment and intervention planning and implementation for clients across the full range of disabilities and across the lifespan. Observation and practice in speech and language therapy at the Edward D. Mysak Clinic for Communication Disorders and at related field facilities. Majors enroll until practicum requirements for the M.S. degree are completed. Special fee: \$150.

### **BBSQ 5333 THERAPY PRACTICUM: LABORATORY METHODS AND INSTRUMENTATION IN CLINICAL PRACTICE**

Instruction and practice in acoustic and physiologic measures related to voice, articulation, and fluency disorders. Majors must enroll for one term. Special fee: \$150.

### **BBSQ 5335 THERAPY PRACTICUM: INFANT EVALUATION CLINIC**

Observation and participation in the evaluation of pre-speech and feeding behaviors in at-risk infants and in the development of individualized management programs. Special fee: \$150.

### **BBSQ 5336 THERAPY PRACTICUM: STUTTERING CLINIC**

*Prerequisite: BBSQ 5114 Stuttering or equivalent.* Observation and discussion of assessment, remediation, and prevention of fluency disorders. Special fee \$150.

**BBSQ 5343 HEARING MEASUREMENT**

Practice in hearing screening, audiological evaluation, and aural rehabilitation issues across the lifespan. Special fee: \$150.

**BBSQ 5815 PEDIATRIC DYSPHAGIA, BIRTH TO 21**

The course will cover dysphagia across pediatric ages, birth to 21, and as it is evaluated and treated in four pediatric settings--the neonatal intensive care unit, early intervention, pre-schools, and schools. This course cannot be used as a replacement for the program requirement, BBSQ 5130, Dysphagia Assessment and Management. It is a good elective for students interested in pediatrics, those who will be working in school settings, and those interested particularly in dysphagia.

**BBSQ 5940 EVALUATING RESEARCH IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY**

Evaluation of research methods and the interpretation of research leading to evidence-based practice approaches.

**BBSQ 5941 RESEARCH NEEDS AND METHODS IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY**

*Prerequisite: BBSQ 5940 Evaluating of research.* Required of first-year doctoral students. Development of rationales for doctoral dissertations and projects.

**BBSQ 6351 ADVANCED PRACTICE: CLINICAL**

Doctoral students are required to register in four sections during their period of candidacy. Observation of faculty during therapy, diagnosis, supervisory, teaching, or research activities and participation in such activities.

**BBSQ 6352 ADVANCED PRACTICE: SUPERVISION**

Doctoral students are required to register in four sections during their period of candidacy. Observation of faculty during therapy, diagnosis, supervisory, teaching, or research activities and participation in such activities.

**BBSQ 6353 ADVANCED PRACTICE: TEACHING**

Doctoral students are required to register in four sections during their period of candidacy. Observation of faculty during therapy, diagnosis, supervisory, teaching, or research activities and participation in such activities.

**BBSQ 6354 ADVANCED PRACTICE: LABORATORY**

Doctoral students are required to register in four sections during their period of candidacy. Observation of faculty during therapy, diagnosis, supervisory, teaching, or research activities and participation in such activities.

**BBSQ 6355 ADVANCED PRACTICE: ADMINISTRATION**

Doctoral students are required to register in four sections during their period of candidacy. Observation of faculty during therapy, diagnosis, supervisory, teaching, or research activities and participation in such activities.

**BBSQ 6514 LANGUAGE: BRAIN, BIOLOGY AND LANGUAGE ACQUISITION**

For doctoral candidates and advanced master's degree students in speech-language pathology. Doctoral candidates are required to enroll in at least three sections of seminars in the BBSQ 6513-6517 series. Seminars involve intensive study and analysis of current research and issues in the particular topics.

**BBSQ 6516 SEMINAR ON FLUENCY AND ITS DISORDERS**

For doctoral candidates and advanced master's degree students in speech-language pathology. Doctoral candidates are required to enroll in at least three sections of seminars in the BBSQ 6513-6517 series. Seminars involve intensive study and analysis of current research and issues in the particular topics.

**BBSQ 6517 NEUROPATHOLOGY OF SPEECH**

This seminar involves intensive study and analysis of current research and issues in treatment research design and practice in pediatric motor speech disorders. For doctoral students, the seminar will also address the development of their dissertation study (literature review, research questions, design).

**BBSQ 6940 SUPERVISED RESEARCH IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY**

*Prerequisite: BBSQ 5941 Research methods.* Doctoral candidates are required to enroll in their advisor's section for both semesters. Opportunity to design and conduct pilot studies and projects.

**BBSQ 6941 SUPERVISED RESEARCH IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY**

*Prerequisite: BBSQ 5941 Research methods.* Doctoral candidates are required to enroll in their advisor's section for both semesters. Opportunity to design and conduct pilot studies and projects.

**BBSQ 7500 DISSERTATION SEMINAR IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY**

*Prerequisite BBSQ 6941 Supervised research.* Development of doctoral dissertations and projects and presentation of plans for approval. Doctoral candidates are required to enroll for one year and must begin the sequence in the fall term immediately following completion of BBSQ 6941.

**BBSQ 8900 DISSERTATION-ADVISEMENT IN SPEECH-LANGUAGE PATHOLOGY AND AUDIOLOGY**

*Prerequisite: BBSQ 7500 Dissertation seminar.* Individual advisement on doctoral dissertations. Fee to equal 3 points at current tuition rate for each term. For requirements, see section in catalog on Continuous Registration for Ed.D./Ph.D. degrees.