

Audiology and Communication Sciences

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Courses

PACS 3000 Acoustics and Speech Perception

Topics include principles of acoustics, with applications to speech and hearing. Basic physics of sound -- including simple harmonic motion, wave propagation in air, resonance, sound measurement and spectral analyses, filtering, and digital sound processing -- are discussed. Principles will be applied to the production and physical properties of speech. An overview of the acoustic characteristics of individual speech sounds and of suprasegmental speech patterns will be provided. Perceptions of speech and non-speech sounds are discussed.

Credit 3 units.

Typical periods offered: Spring

PACS 3010 Introduction to Audiology

This course covers the role of the audiologist in the diagnosis and treatment of hearing loss; the administration and interpretation of audiologic test results; and amplification systems and assistive devices. It explores practical experience with the clinical issues professionals will face when working with individuals who are deaf or hard of hearing. This course is recommended for future practitioners in speech-language pathology/audiology/deaf education who will be serving individuals with hearing loss across the lifespan.

Credit 3 units.

Typical periods offered: Fall

PACS 3993 Observation in Audiology

Provides students with an introduction to clinical methods and observation experiences in audiology. Prerequisite: Permission of department required. Important note: Students must complete screening requirements to be eligible to observe in clinical spaces. Visit <https://hr.wustl.edu/non-appointee-visitor-observer/> for information.

Credit 3 units.

Typical periods offered: Fall

PACS 3994 Observation and Methods in Speech-Language Pathology

This course surveys a broad range of speech and language disorders in terms of associated characteristics, assessment techniques, and treatment considerations. Prerequisite: Permission of department required. Important note: Students must complete screening requirements to be eligible to observe in clinical spaces. Visit <https://hr.wustl.edu/non-appointee-visitor-observer/> for information.

Credit 3 units.

Typical periods offered: Fall

PACS 4000 Anatomy and Physiology of Speech and Hearing

General introduction to anatomy (structure) and physiology (function) of the auditory, vestibular, and speech production systems, including organ systems of audition, articulation, and phonation (nervous, respiratory, and musculoskeletal systems). Covers normal and disordered structure and function.

Credit 3 units.

Typical periods offered: Fall

PACS 4050 Sign Language I

Basics of American Sign Language are introduced, including vocabulary, grammatical structure, fingerspelling, and cultural information about the Deaf community. This is a highly interactive and participatory course.

Credit 2 units. EN: H

Typical periods offered: Fall

PACS 4051 Sign Language II

Continues development of American Sign Language with additional vocabulary, emphasis on expressive and receptive abilities, conversational skills, and knowledge of Deaf culture. This is a highly interactive and participatory course.

Credit 2 units. EN: H

Typical periods offered: Spring

PACS 4052 Sign Language III

Continues development of American Sign Language with additional vocabulary, emphasis on expressive and receptive abilities, conversational skills. Expands knowledge of deaf culture/history specific to D/deaf Education and American Sign Language. This is a highly interactive and participatory course.

Credit 2 units.

Typical periods offered: Fall

PACS 4060 Typical Language Development

Study of typical language development, including the phonologic, morphologic, semantic, syntactic and metalinguistic aspects. Interactions between linguistic and other areas of child development will be discussed. Contrasts will be explored between typical and atypical child development to shed light on language learning processes.

Credit 3 units.

Typical periods offered: Fall

PACS 4080 Speech and Language Disorders

This course surveys a broad range of speech and language disorders in terms of associated characteristics, assessment techniques and treatment considerations. Department permission required to enroll in course.

Credit 3 units.

Typical periods offered: Spring

PACS 5000 Anatomy and Physiology of Speech and Hearing

Comprehensive introduction to anatomy (structure) and physiology (function) of the auditory, vestibular, and speech production systems, including organ systems of audition, articulation, and phonation (nervous, respiratory, and musculoskeletal systems). Covers normal and disordered structure and function. All undergraduate students should register for Section 01.

Credit 3 units.

Typical periods offered: Fall

PACS 5702 Research Seminar

A seminar of variable topics related to research in speech and hearing sciences. Each semester/section has its own specific area of focus, which may include an investigation of active areas of research, an overview of outcomes-based research and evidence-based practice for students' research projects, or thorough analysis and discussion of a specific area of active research. See section description for information on specific topics by section. Department permission required to enroll in this course.

Credit 1 unit.

Typical periods offered: Fall, Spring

PACS 5710 Journal Club

Presentation and discussion of current issues and recent research in the fields related to hearing and deafness. Department permission required to enroll.

Credit 6 units.

PACS 6010 Behavior Management

Introduction to various behavior management systems effective in both individual and group environments. Behavior interventions, classroom management strategies, environmental controls, psychodynamic techniques, and biophysical interventions are discussed, observed, and practiced. Focus is on working with children who are deaf or hard of hearing.

Credit 2 units.

Typical periods offered: Fall

PACS 6020 Evaluation Techniques for Children Who Are Deaf or Hard of Hearing

A basic introduction to psychometrics with emphasis on the selection, interpretation, and evaluation of assessments. Specific techniques for evaluating intellectual, educational, and linguistic abilities and achievement in children who are deaf or hard of hearing, from infancy through adolescence, are discussed and demonstrated.

Credit 3 units.

Typical periods offered: Fall

PACS 6040 Early Literacy Development of Children Who Are Deaf or Hard of Hearing

Development of early print-recognition, reading, and writing of children who are typically hearing and children who are deaf or hard of hearing. Focus is on the years leading up to kindergarten. An overarching theme is the interaction between early language and early literacy development. Evidence-based strategies for differentiated instruction will also be discussed. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Fall

PACS 6050 Amplification Systems and Aural Rehabilitation for Children

This course will provide students with a broad understanding of amplification systems and principles and methods of aural rehabilitation as they apply to children who are deaf or hard of hearing. Amplification systems to be covered will include digital hearing aids, cochlear implants and a full range of assistive devices. Aural rehabilitation topics will emphasize patient management and will include communication strategies, conversation styles and speech recognition assessment. Students will be provided with videos, live demonstrations and in-class activities. Direct contact with children and technological devices will also be used to support lectures and discussions. Department permission required to enroll in course.

Credit 2 units.

Typical periods offered: Spring

PACS 6060 Language Instruction for Children Who Are Deaf or Hard of Hearing

Principles and methods of developing competence in spoken English in children who are deaf or hard of hearing, birth to grade 12. Includes presentation of differentiated instructional techniques for teaching a diverse population of children who are deaf or hard of hearing English vocabulary, syntax, and pragmatics, as well as techniques for auditory training. Evaluations and data-driven lesson planning/IEP/IFSP development will be discussed, as well as the role of families as engaged, educational partners in spoken language development. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Fall

PACS 6070 Foundations of Literacy Theory and Instruction

Principles and methods of developing reading and writing competence in children who are typically hearing, with an emphasis on the stages of development and appropriate teaching sequences. Based on this foundation, strategies and methods will be presented for making appropriate differentiated learning adaptations and interventions for reading instruction with students who are deaf or hard of hearing who have language and reading deficits. Additional topics include the use of children's literature in instruction, the intersection of language and reading development, content literacy, and general language arts instruction. Department permission required to enroll in this course.

Credit 4 units.

Typical periods offered: Spring

PACS 6071 Literacy Lab: A Focus On Typical and Atypical Learners

Emphasizes observation and some practice planning and teaching reading and writing with students who are typical and atypical learners, including children who are deaf or hard of hearing and who struggle to develop appropriate literacy skills. Observations will focus on areas such as how teachers use differentiated learning strategies for diverse learners, the use of children's literature in instruction, the intersection of language and reading development, instruction in content literacy, and general language arts instruction. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring

PACS 6080 Counseling Parents of Children Who Are Deaf or Hard of Hearing

Examines the psychological needs of families who have children who are deaf or hard of hearing. The aim of the course is to help teachers of children who are deaf or hard of hearing interact more effectively with parents and caregivers, using a collaborative model that views families as engaged partners in the educational process. Students will develop a repertoire of interviewing and counseling skills, as well as learn about a wealth of resources to share with families. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Spring

PACS 6090 Speech for Children Who Are Deaf or Hard of Hearing

Development, improvement and maintenance of speech skills for children who are deaf or hard of hearing through multisensory approaches. Articulation, voice and rhythm patterns are considered. Lectures, demonstrations and practice. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Spring

PACS 6100 Psychosocial and Educational Foundations of Deafness

Examines psychological, social, educational, legal, historical, and cultural influences related to individuals who are deaf or hard of hearing. Additional topics include IEPs and interprofessional collaboration related to post-high school transitions. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring

PACS 6110 Mathematics And Content-Area Instruction for Children Who Are Deaf or Hard of Hearing I

Principles and methods of teaching mathematics to students who are typically hearing and those who are deaf or hard of hearing. Strategies for other content-area instruction (science, social studies), use of instructional technology, and strategies for improving content literacy will also be discussed, with an emphasis on techniques for working with children who are deaf or hard of hearing. Students will practice developing and implementing lesson plans that are aligned to state and national standards. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Spring

PACS 6111 Mathematics And Content-Area Instruction for Children Who Are Deaf or Hard of Hearing II

Principles and methods of teaching mathematics to students who are typically hearing and those who are deaf or hard of hearing. Strategies for other content-area instruction (science, social studies), use of instructional technology, and strategies for improving content literacy will also be discussed, with an emphasis on techniques for working with children who are deaf or hard of hearing. Students will practice developing and implementing lesson plans that are aligned to state and national standards. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Fall

PACS 6120 Fundamentals of Early Intervention and Child Development

Course provides information about general and exceptional child development, focusing on ages birth through five years. Course also discusses historical and philosophical tenets of early intervention practice, focusing on a collaborative coaching model, which views families as engaged partners in the child's education. Other topics include addressing needs of families from a variety of cultural and economic backgrounds, linking families to resources, and Federal laws that govern special education services for children with disabilities including transitions in service provisions for children at the age of 3 years. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring

PACS 6122 Early Intervention: Serving Children Who Are Deaf or Hard of Hearing, Birth to Age 5

This course provides an overview of early childhood development of children who are deaf or hard of hearing, birth to age 5, with particular focus on early speech and language development, intervention strategies, assessment techniques, instructional strategies, and aural rehabilitation. Course discusses the philosophical tenets of early intervention practice, which views families as engaged partners in

the child's education, and respects cultural and linguistic diversity. Students will learn about IFSP and IEP development, as well as a variety of resources that can be provided to families. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Fall

PACS 6130 Pre-Service Teacher Preparation

This course is designed to help students in the deaf education teacher training program create a teaching portfolio that reflects their own teaching development. Students will demonstrate their ability to reflect on and critique their own teaching practice especially in relation to course planning, instructional strategies, differentiated learning, data-based decision-making, tiered systems for supporting instruction, and classroom management. Professional issues, including developing a résumé and conducting interviews, will also be discussed. Department permission required to enroll in this course.

Credit 1 unit.

Typical periods offered: Fall

PACS 6900 Independent Study

Students engage in independent work on the Independent Study, which demonstrates advanced critical thinking and writing skills. Department permission required to enroll in this course.

Credit 6 units.

Typical periods offered: Fall, Spring, Summer

PACS 7010 Clinical Audiology

An introduction to the field of clinical audiology. Covers the role of the audiologist in the diagnosis and treatment of hearing disorders; the administration and interpretation of audiologic test results; and amplification systems and assistive devices, such as DM/FM technology. Additional topics may include relevant calibration and instrumentation requirements, audiology as a career, aural rehabilitation, and legal and ethical issues in the field.

Credit 3 units.

PACS 7411 Practicum in Deaf Education

Supervised practicum in education of children who are deaf or hard of hearing. Students will be placed in field experiences (early, mid-level, and culminating levels) in a variety of educational settings with a variety of age ranges, using interventions in areas such as language, speech, auditory training, reading, math, and other content areas. Department permission required to enroll in the course.

Credit 1-12 units.

Typical periods offered: Fall

PACS 7412 Practicum in Deaf Education

Supervised practicum in education of children who are deaf or hard of hearing. Students will be placed in field experiences (early, mid-level, and culminating levels) in a variety of educational settings with a variety of age ranges, using interventions in areas such as language, speech, auditory training, reading, math, and other content areas. Department permission required to enroll in this course.

Credit 1-12 units.

Typical periods offered: Spring

PACS 8000 Anatomy and Physiology of Speech and Hearing

Comprehensive introduction to anatomy (structure) and physiology (function) of the auditory, vestibular, and speech production systems, including organ systems of audition, articulation, and phonation (nervous, respiratory, and musculoskeletal systems). Covers normal and disordered structure and function.

Credit 3 units.
Typical periods offered: Fall

PACS 8010 Clinical Audiology I

An introduction to the field of clinical audiology. Covers the role of the audiologist in the diagnosis and treatment of hearing disorders; the administration and interpretation of audiologic test results; and amplification systems and assistive devices, such as DM/FM technology. Additional topics may include relevant calibration and instrumentation requirements, audiology as a career, aural rehabilitation, and legal and ethical issues in the field. Department permission required to enroll in this course.

Credit 3 units.
Typical periods offered: Fall

PACS 8011 Clinical Audiology II

Covers hearing evaluation and diagnosis in clinical audiology from infancy through adulthood. Topics include auditory processing disorders, functional hearing loss, and other advanced measures. Department permission required to enroll in this course.

Credit 3 units.
Typical periods offered: Spring

PACS 8020 Introduction to Electroacoustics

Introduction to the physics of sound. Topics include production, transmission, and reception of sound and factors affecting human communication. Includes discussion, lectures, problems, and lab.

Credit 3 units.
Typical periods offered: Fall

PACS 8030 Rehabilitative Audiology

Principles and methods of aural rehabilitation with an emphasis on patient management. Topics include communication strategies and conversation styles, speech recognition assessment and hearing aid service provisions for adults, older persons, children, and family members. Department permission required to enroll in this course.

Credit 3 units.
Typical periods offered: Fall, Spring

PACS 8040 Pediatric Audiology

Fundamentals of audiologic assessment for infants and children. Behavioral and electrophysiologic procedures, and assessment of auditory processing abilities, are presented. Department permission required to enroll in this course.

Credit 3 units.
Typical periods offered: Fall

PACS 8050 Business Practices

Issues relating to establishing a private practice including clinical management, small business and accounting practices, models of private practice, referrals and reimbursement, and managed care. Department permission required to enroll in this course.

Credit 2 units.
Typical periods offered: Fall, Summer

PACS 8052 Leadership Skills and Precepting

Provides an overview of effective leadership skills for future audiologists, as well as knowledge and skills needed to effectively serve as a preceptor in a clinical setting.

Credit 1 unit.
Typical periods offered: Fall

PACS 8060 Electrophysiologic Techniques I

Introduces basic concepts in administration and interpretation of physiologic and electrophysiologic measures, with focus on auditory evoked potentials (AEP). Content covers basic instrumentation, parameters and variables affecting the AEP, auditory brainstem response (ABR), middle (MLR) and late (LLR) evoked potentials, auditory steady state response (ASSR) and otoacoustic emissions (OAE). Department permission required to enroll in this course.

Credit 3 units.
Typical periods offered: Fall

PACS 8061 Electrophysiology II

Advanced concepts related to the administration and interpretation of physiologic and electrophysiologic measures. Content includes in-depth study of ABR and other auditory evoked potentials, and the clinical application of these for the audiologist. Additional topics include study of electrocochleography (ECoChG), P300 auditory responses, and mismatched negativity (MMN). This course will include a thorough study of intraoperative monitoring including neurophysiology and anatomy review, cranial nerve monitoring, spinal cord monitoring, and facial nerve monitoring. Department permission required to enroll in this course.

Credit 1 unit.
Typical periods offered: Summer

PACS 8070 Pharmacology

Includes basic information related to medications utilized for treating common hearing/balance disorders. Hearing and balance side effects of medications are discussed, as are ototoxic and preventative mechanisms related to pharmacology. Department permission required to enroll in this course.

Credit 1 unit.
Typical periods offered: Summer

PACS 8080 Auditory Neuroscience

Development of an in-depth understanding of issues related to auditory neurophysiology from the auditory nerve to the cortex. Department permission required to enroll in this course.

Credit 2 units.
Typical periods offered: Spring

PACS 8090 Genetics in Hearing Loss

Study of the genetic causes of hearing loss and balance disorders, and syndromes affecting the auditory and vestibular systems. Department permission required to enroll in this course.

Credit 1 unit.
Typical periods offered: Fall, Summer

PACS 8100 Vestibular Disorders

Comprehensive course covering the assessment, diagnosis, and treatment of vestibular disorders. Department permission required to enroll in this course.

Credit 3 units.
Typical periods offered: Spring

PACS 8110 Auditory Perception

Study of how the listener perceives parameters of and differences in acoustical stimuli. Perception of the speech stimulus is also studied in detail, both for listeners who are typically-developing and those who are deaf or hard of hearing. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Spring

PACS 8120 Hearing Conservation

This course will cover topics related to hearing conservation, including effects of noise on hearing, environmental noise, classroom acoustics, federal regulations, interactions of noise and other agents, and ototoxicity. Additional topics may vary year-to-year. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring, Summer

PACS 8130 Counseling for Audiology

Examines the relationship between clinician and patient in audiology. Topics include counseling theory and practices, and principles and methods of effective interviewing and counseling across the lifespan. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Summer

PACS 8140 Hearing Devices in Audiology I

Philosophical issues related to the selection and evaluation of hearing devices, including hearing aids and alternative devices. Means of adjusting hearing devices and measuring their function and benefit are covered.

Credit 4 units.

Typical periods offered: Fall

PACS 8141 Hearing Devices in Audiology II (Cochlear Implants)

Covers the selection and fitting of implantable hearing devices including candidacy, psychophysical testing, electrophysiologic testing, programming of the devices, and auditory training. Includes lectures and discussion. Department permission required to enroll in this course.

Credit 3 units.

Typical periods offered: Fall

PACS 8142 Hearing Devices in Audiology III (Pediatrics)

This course will cover essential topics related to pediatric amplification. Topics include device candidacy, selection of devices and relevant features, device fitting methods and protocols, verification of fitting, device orientation, hearing assistive technology (HAT), and considerations for special populations. All devices available for the pediatric population will be covered: hearing aids, bone anchored hearing aids, and cochlear implants. Lectures, in-class demonstrations, and lab activities will be used to illustrate procedures and protocols for device fitting. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Fall, Spring

PACS 8150 Hearing Disorders

This course covers the nature and causes of hearing disorders, including outer and middle ear, cochlear, retrocochlear and central nervous system. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring

PACS 8300 Audiology Staffing

Discussion and presentations of clinical cases and issues related to practice in clinical audiology. Permission of department required.

Credit 0.5 units.

Typical periods offered: Fall, Spring

PACS 8310 Clinical Skills

Clinical competency checkpoint; topics will vary (see program curriculum for topic by year/semester).

Credit 0.5 units.

Typical periods offered: Fall, Spring

PACS 8411 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 1 unit.

Typical periods offered: Fall

PACS 8412 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 1 unit.

Typical periods offered: Spring

PACS 8413 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 4 units.

Typical periods offered: Summer

PACS 8421 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 1-3 units.

Typical periods offered: Fall

PACS 8422 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring

PACS 8423 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 4 units.

Typical periods offered: Summer

PACS 8431 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 2 units.

Typical periods offered: Fall

PACS 8432 Practicum in Audiology

Supervised practicum in audiology. Permission of department required to enroll in this course.

Credit 2 units.

Typical periods offered: Spring

PACS 8433 Practicum in Audiology

Supervised practicum in audiology. Department permission required to enroll in this course.

Credit 6 units.
Typical periods offered: Summer

PACS 8441 Clinical Externship in Audiology

Clinical externship in audiology. Department permission required to enroll in this course.
Credit 9 units.
Typical periods offered: Fall

PACS 8442 Clinical Externship in Audiology

Clinical externship in audiology. Department permission required to enroll in this course.
Credit 9 units.
Typical periods offered: Spring

PACS 8499 Pre-Clinical Externship

Clinical externship in audiology application process.
Credit 1 unit.
Typical periods offered: Fall

PACS 8500 Geriatric Audiology

Study of general aging and age-related hearing loss. Will provide foundational knowledge in the fundamental concepts of aging common to most species, normal and pathological processes in auditory physiology across the lifespan, assessment and treatment of hearing loss in older adults, and non-auditory factors that affect clinical intervention and treatment strategies for older patients (e.g., cognition, mental health, physical limitations). Department permission required to enroll in this course.
Credit 2 units.
Typical periods offered: Spring

PACS 8600 Hearing and Communication Seminar

Provides an overview of hearing, auditory neuroscience, language, and deaf education.
Credit 3 units.
Typical periods offered: Fall, Spring

PACS 8700 Statistics and Research Methods

Examines experimental and field research methods as they apply to audiology and communication sciences. Covers such methods as surveys, survey interviews, content analysis, and experimental design. Department permission required to enroll in this course.
Credit 3 units.
Typical periods offered: Spring

PACS 8710 Introduction to Scientific Literature

This course introduces students to the study of hearing science through search and examination of scientific literature, including the critical review, discussion, and application of scientific literature as it relates to clinical practice in the field.
Credit 0.5 units.
Typical periods offered: Spring

PACS 8800 Capstone Project Seminar

This weekly, joint meeting is intended to provide extra and preliminary support for initiation of the Capstone Project. Areas will include but are not limited to: journal article critique, scientific writing, overview of research design and methodologies, statistical review, support for graph and table construction, and others. Department permission required to enroll in this course.

Credit 1 unit.
Typical periods offered: Fall, Spring

PACS 8900 Capstone Project

Independent work on the Capstone Project. Department permission required to enroll in the course.
Credit 1-6 units.
Typical periods offered: Fall, Spring

PACS 9000 Full-Time Graduate Study/Research

Full-time graduate study and/or research; students enrolled in this course have full-time status.
Credit 0 units.
Typical periods offered: Fall, Spring

PACS 9001 Full-Time Graduate Study in Absentia

Full-time graduate study in absentia; students enrolled in this course have full-time status.
Credit 0 units.
Typical periods offered: Fall, Spring

PACS 9002 Full-Time Graduate Study Extension

Full-time graduate study extension; students enrolled in this course have full-time status.
Credit 0 units.
Typical periods offered: Fall, Spring

PACS 9100 Special Topics

Special topics in speech and hearing sciences, audiology and/or education of the deaf or hard of hearing. Contact the department for more information. Department permission required to enroll in this course.
Credit 4 units.
Typical periods offered: Fall, Spring

PACS 9600 Research Design and Methods

A review of statistical concepts learned and discussion of their application in research projects. Will include selection of statistical tests in different projects with different types of data and data distributions, as well as the interpretation of the results of the statistical analysis in lieu of clinical importance and generalizability of results. Course will also include a critical review of statistical methods used in published articles chosen for discussion. Department permission required to enroll in this course.
Credit 2 units.
Typical periods offered: Fall

PACS 9800 Research in Speech and Hearing

Independent research (pre-dissertation). Department permission required to enroll in this course.
Credit 12 units.
Typical periods offered: Fall, Spring, Summer

PACS 9900 Dissertation Research

Dissertation research. Department permission required to enroll in this course.
Credit 12 units.
Typical periods offered: Fall, Spring
