Curriculum 2016-2018

GENERAL INFORMATION

Programme Description

The Masters Degree Programme in Music, Mind & Technology consists of 120 ECTS and requires two academic years of full-time study.

The programme bridges the topics of cognitive science, psychology, perception and music technology into one unique and multidisciplinary programme. The aim of integrating such topics is to provide students a thorough experience of designing, executing and reporting empirical investigations within this broad field.

We admit students with different backgrounds, which can range from highly technical disciplines to humanistic studies. The students are selected based on the suitability of their background but also on their enthusiasm and interest in the course content, and their motivation to work within a multidisciplinary team with multicultural colleagues. Teaching in the programme leans mainly on principles of constructive learning and collaborative approaches are applied throughout the courses in the programme.

The programme courses are separated into four main areas: Core Courses+Thesis work, General/Common Courses with Music Therapy, Research Methods, Elective studies based on Personal Study Plan, and Communication & language studies. The orientation and emphasis in studies can be: *psychology/cognition, technology, aesthetics, and education*. Personal study plans are devised with keeping in mind the individual student's academic background, current interests, and future ambitions.

The applicants are expected to possess knowledge of music theory and research methods. Because the MMT programme focuses on scientific research, practical music skills are not required from applicants.

Learning Outcomes

The learning outcomes of Masters Degree Programme in Music, Mind & Technology are:

- Expertise of the main areas of contemporary research on music perception and cognition
- Competences in using various technologies and an aptitude for applying relevant technology to research projects (e.g. motion capture, EEG, sensor technology, music production software, music studio equipment)
- Experience for carrying out academic projects in a multidisciplinary, and multicultural research team
- Development of critical thinking skills for reading and interpreting academic literature
- A general comprehension of standard quantitative and qualitative research methods, as well as specialised methods related to the topic of the research project
- Capacities in designing, executing and reporting empirical investigations
- Attaining a skill set and academic profile suitable for interdisciplinary PhD studies

Table 1 Students take courses from several unit sections. Breakdown of Unit Sections per credit. Students complete total of 120 ECTS.

Unit Section	Number of ECTS
Music, Mind & Technology (core courses + thesis work)	70
Music Psychology Training (general common courses with Music Therapy)	15
Research Methods	10
Elective units based on personal study plan	10
Communication and Language Studies*	15
TOTAL CREDITS	120

*includes Integrated Research Communication and Suomi 1 & Suomi 2. Native Finnish   students substitute languages units with units on Academic Writing, or take additional Elective Units.

Table 2 MMT Programme Calendar

MUSIC, MIND & TECHNOLOGY UNITS (70 ECTS)

These courses are the default required courses for students enrolled in the MMT programme. These courses expose students to the technological tools for studying music cognition and perception, and through action-based learning, demonstrate how to carry out research projects.

MMTS021 Music Perception I (5 ECTS)

Learning Outcomes	After completing the course the student is able to: • Describe main research areas and key findings in music perception research • Understand key issues that govern the cognitive processes involved in music perception and production • Understand the basics of main methodologies used to study music perception
Contents	The course is a survey on the main sub-fields of music perception research.
Modes of study	Lectures; group work; demonstrations; private study
Completion modes	Written assignments; exam; group presentations
Learning Materials	• J. Schnupp, I. Nelken, & A. King (2012). Auditory Neuroscience: Making Sense of Sound. MIT Press: Cambridge, MA. • W. F. Thompson (2009). Music, thought, and feeling. Understanding the psychology of music. OUP: New York. • P.R. Cook (ed). (1999). Music cognition and computerized sound. An introduction to psychoacoustics. The MIT Press: Cambridge, MA. f
Scheduling	2nd semester
Assessment	0-5

MMTS022 Music Perception II: Project (5 ECTS)

Learning Outcomes	After completing the course the student is able to: • Apply a data collection and analysis method to study music perception • Report the results of an experiment • Speak with authority about the study's methods, findings and implications
Contents	In groups of 2-3, students design, carry out, and report an original research project, or reproduce an experiment carried out in a seminal perception.
Modes of study	Group work; private study; written assignments; oral presentation
Completion modes	Oral presentation; research report

MMTS021 Music Perception I (5 ECTS)

Learning Materials	
	• teacher-generated materials
Scheduling	2nd semester
Assessment	0-5

MMTS046 Music Production (5 ECTS)

Learning Outcomes	After completing the course the student is able to:
	• Understand basic theoretical issues related to digital audio, MIDI, sequencer, notation, digital sound recording and editing, sound analysis, synthesis and manipulation
	• Apply this knowledge in various areas of music research
	• Create objects of digital music for artistic, educational or research purposes
Contents	
Modes of study	Group work; private study; written assignments; oral presentation
Completion modes	Demonstrations; workshops; group work; lab work
Learning Materials	• Peter Manning (2004). Electronic and Computer Music, Oxford University Press (JYU Library)
	• Additional literature: to be announced during the course
Scheduling	1st semester
Assessment	0-5

MMTS047 Music Computing (5 ECTS)

Learning Outcomes	After completing the course the student is able to:
	• Define the principle factors of a digital audio system
	• Implement sound synthesis and audio processing algorithms/functions in MATLAB and Max/MSP
	• Apply knowledge of digital audio for research purposes such as music information retrieval
Contents	Introduction to digital audio analysis software (MATLAB MIRToolbox & Max/MSP and development of programming skills in MATLAB and Max.
Modes of study	Demonstrations; group work; lab work; project

MMTS047 Music Computing (5 ECTS)

Completion modes	assignments; project
Learning Materials	• MIRToolbox Manual • Max online tutorials and teacher generated materials
Scheduling	1st semester
Assessment	0-5

MMTS048 Applied Music Technology (5 ECTS)

Learning Outcomes	After completing the course the student is able to: • Understand theoretical issues related to human-computer interaction in musical expression • Understand the relationship between motion, gesture and music • Design and create new musical applications, controllers, interfaces and instruments for artistic, educational, well-being or research purposes
Contents	This module aims to familiarise students with advanced theoretical issues related to the analysis, manipulation, and synthesis of musical sound. Students become acquainted with the basics of algorithmic and interactive music systems as well as musical development environments. The module also includes practical work on advanced sound analysis, sound manipulation and sound synthesis, as well as development of interactive music systems.
Modes of study	Demonstrations; group work; lab work; project
Completion modes	assignments; project
Learning Materials	• Teacher generated materials
Scheduling	2nd semester
Assessment	0-5

MMTS049 Applied Music Technology: Project (5 ECTS)

Learning Outcomes	After completing the course the student is able to: • Master a practical application of human-computer interaction in musical expression • Design and create new musical applications, controllers, interfaces and instruments for artistic, educational, well-being or research purposes
Contents	This module functions as the practical component of Applied Music Technology. Students work in teams to produce a performance using one or more of the technologies introduced in Applied Music Technology. The performance can be research-driven or purely artistic but must surround the analysis, manipulation and/or synthesis of musical sound.
Modes of study	Demonstrations; group work; lab work; project
Completion modes	project; concert
Learning Materials	• Teacher generated materials
Scheduling	2nd semester
Assessment	0-5

MMTS080 Thesis (40 ECTS)

Learning Outcomes	After completing the course the student is able to: • Plan and execute a personal research project • Synthesise and critically evaluate pertinent literature • Report a research project and critically evaluate the results
Contents	The Masters thesis is based on a personal research project carried out during the student's studies. Students often join existing research groups and conduct analyses on existing data, or plan and carry out original research. Students work closely with at least one advisor from the Music Department, or work with an advisor from a different department.
Modes of study	Independent research work under the tutelage of a designated supervisor; group supervision sessions.
Completion modes	Prp Gradu Thesis
Scheduling	3rd and 4th semester
Assessment	0-5

MUSIC PSYCHOLOGY TRAINING UNITS (15 ECTS)

MMTS011 Music Psychology I (5 ECTS)	
Learning Outcomes	After completing the course the student is able to: • Describe psychological processes related to areas such as musical skill development, musical preferences, music and personality, music and movement, music and emotion, and the social psychology of music. • Critically evaluate, compare and summarise various theoretical propositions and empirical studies related to psychological and social aspects of musical behaviour.
Contents	The course is a survey on the main sub-fields of music psychology research. The course features guest lectures given by several of the researchers within the Music Department. Thus, the course also introduces students to the department's research strategy.
Modes of study	Lectures; literature
Completion modes	Learning diary; group work; exam
Learning Materials	• S. Hallam, I. Cross & M. Thaut (eds.) (2009). Oxford Handbook of Music Psychology. OUP. New York. • W. F. Thompson (2009). Music, thought, and feeling. Understanding the psychology of music. OUP: New York. • P. N Juslin & J. A. Sloboda (Eds.) (2001), Music and Emotion: Theory and Research. New York: Oxford University Press. / Juslin, P. N. & Sloboda, J. A. (Eds.) (2009). Handbook of Music and Emotion: Theory, Research, Applications. Oxford: OUP. • North, A. C. & Hargreaves, D. J. (Eds.) (1997). The Social Psychology of Music. London; O.U.P. • Teacher-generated materials
Scheduling	1st semester
Assessment	0-5

These courses and units are shared with Masters Degree Programme in Music Therapy.

MMTS012 Music Psychology II: Project (5 ECTS)

Learning Outcomes	After completing the course the student is able to: • Independently gather and synthesise information from self-chosen music psychological topics • Construct an overview of the various theoretical propositions and empirical studies related to these topics • Discuss the chosen topics from the viewpoints of their relevance to the field, possible applications, and research questions • Present the above-mentioned both orally and in writing • Gain experience in designing and carrying out a small-scale research experiment
Contents	Students select a topic to focus on for the duration of the course. The first assignment is to give a group presentation and produce a short paper in which they compare and contrast two seminal research papers on a topic related to music psychology. The second assignment is to focus on one seminal paper and attempt to reproduce the paper's results through a similar methodology. The results of this assignment are given in an oral presentation and lab report
Modes of study	Lectures; literature; essay
Completion modes	Group presentations; essay
Learning Materials	• S. Hallam, I. Cross & M. Thaut (eds.) (2009). Oxford Handbook of Music Psychology. OUP. New York. • W. F. Thompson (2009). Music, thought, and feeling. Understanding the psychology of music. OUP: New York. • P. N Juslin & J. A. Sloboda (Eds.) (2001), Music and Emotion: Theory and Research. New York: Oxford University Press. / Juslin, P. N. & Sloboda, J. A. (Eds.) (2009). Handbook of Music and Emotion: Theory, Research, Applications. Oxford: OUP. • North, A. C. & Hargreaves, D. J. (Eds.) (1997). The Social Psychology of Music. London; O.U.P. • Teacher-generated materials
Scheduling	1st semester
Assessment	0-5

MMTS060 Seminar (5 ECTS)

Learning Outcomes	After completing the course the student is able to: • Understand the requirements for the planning, executing, and reporting of a scientific research project • Comprehend the basic principles of academic writing • Critically evaluate strengths and weaknesses of research projects • Communicate research findings both orally and in writing
Contents	Students choose a research topic for their thesis. In order to pass the course, the student is required to complete his/her Master's Thesis plan. The Seminar is composed of two separate modules worth 5 credits each: Seminar (MMTS060), and Integrated Research Communication (XENX009). The latter is offered by the Language Centre. The time slot of the Seminar is also used for a tutorial on the Optima system, and also for Information Retrieval tutorials (given by the University Library).
Modes of study	Preparation of personal study plan; lectures; seminar sessions; preparation of written reports; oral presentations
Completion modes	idea paper; contrast paper; annotated bibliography; literature review; final research proposal
Learning Materials	• Teacher-generated materials
Scheduling	1st and 2nd semester
Assessment	0-5

RESEARCH METHODS (10 ECTS)

MMT students are required to complete 10 ECTS from Research Methods units. Students without basic research methods experience take *KVVS003 Statistical Methods (5 ECTS), KVVS011 Research Methodology (5 ECTS)* or equivalent. Students with research methods experience must take 10 credits of advanced research method units agreed upon when preparing their Personal Study Plan.

If *KVVS003 Statistical Methods* and *KVVS011 Research Methodology* courses are unavailable, the Music Department will provide the courses Research Methods 1 (5 ECTS) and Research Methods 2 (5 ECTS).

MMTS070 Research Methods 1 & MMTS071 Research Methods 2 (5+5 ECTS)	
Learning Outcomes	After completing the course the student is able to: • List and describe relevant research strategies, data collection methods, and data analysis methods for conducting empirical research in the field of music, mind, and technology. • Critically evaluate the adequacy, reliability, and validity of various research methods in exploring different types of research questions • Apply appropriate methods in conducting small data collection and data analysis tasks • Carry out a statistical analysis within the SPSS and/or MATLAB environments
Contents	This course introduces students to research methods needed to complete the Masters thesis. Topics cover scientific thinking, introduction to experimental design, and qualitative methods. A separate module on statistics (taught by the Department of Communications) will be integrated into the course (5 credits, course code to be determined).
Modes of study	Lectures; literature; exercises; exam
Completion modes	exercises; exam
Literature	Field, Andy. Discovering Statistics with IBM SPSS Statistics. Sage Publishing.
Scheduling	1st and 2nd semester
Assessment	0-5

ELECTIVE UNITS BASED ON PERSONAL STUDY PLAN (10 ECTS)

Study units based on Personal Study Plan (previously known as Specialisation Topics) can be selected from several MMT options or applicable studies offered by the Department of Music, other Departments of the University of Jyväskylä or other universities. Guided by the academic advisor, students select courses that are relevant to their thesis project. Students may join courses in other units (i.e. Music Education) as long as the courses complement rather repeat previous training. These courses are generally taken in the third semester of study. The selection of available study units can vary from year to year.

ELECTIVE COURSES WITH MMT COURSE CODES

MMTS043 Music, Culture & Cognition	
Learning Outcomes	After completing the course the student is able to: • Identify and define the main sub-areas of ethnomusicology. • Proficiency on a variety of musical instruments performed by indigenous groups of Finland
Contents	• How music lives; definition attempts of culture. • Twelve Continuum Transmission Framework. • Reconstructed authenticity - reflections on the image of musical roots. • Music and nationalism; music and censorship. • This module is mainly aimed to students of music psychology training, but is also open for students of musicology and music education, interested in ethnomusicology and topics related to it.
Modes of study	Lectures, seminars, demos, small group projects, playing and singing.
Completion modes	• Active participation in lectures, demos etc. • Small group fieldwork/soundscape projects. • Presentations in small groups. • Mid-term exam. • Final exam.
Learning Materials	A list of basic literature is to be be found in Optima (folder 'Reading material'). Some more specific literature (both printed and online) will be given during the course.
Scheduling	3rd semester
Assessment	0-5

MMTS054 Music Information Retrieval

Learning Outcomes	Students acquire knowledge regarding the core issues of the discipline, and retain a general guide map for future studies
Contents	The course provides an overview of main areas and methodologies in information retrieval that are relevant to music research, including machine learning, signal processing, neuroimaging and semantic computing.
Modes of study	Lectures; Demonstration Workshops; Group work
Completion modes	Survey presentation (individual work); Research project (group work); Project report
Learning Materials	• Alluri, V., Toiviainen, P., Jääskeläinen, I. P., Glerean, E., Sams, M., & Brattico, E. (2012). Large-scale brain networks emerge from dynamic processing of musical timbre, key and rhythm. *NeuroImage, 59(*4), 3677 – 3689. • Domingos, P. (2012). A few useful things to know about machine learning. *Communications of the ACM, 55*(10):78–87. • Foote, J. (2000). Automatic audio segmentation using a measure of audio novelty. In *IEEE International Conference on Multimedia and Expo, volume 1,* pages 452–455. IEEE. • Hyvärinen, A., and Erkki O. (2000). Independent component analysis: algorithms and applications. *Neural networks 13(*4), 411-430.
Scheduling	3rd semester
Assessment	0-5

MMTS055 Research Project Assistant

Learning Outcomes	The student will gain practical research skills (carrying out experiments, writing up lab reports), and master a variety of specialised analysis techniques.
Contents	Internship on a research project supervised by either the student's thesis advisor or other colleague within Musica
Modes of study	Demonstrations; private tutorship; Group work
Completion modes	Completion of research report
Learning Materials	vary according to nature of project
Scheduling	3rd and/or 4th semester
Assessment	0-5

MMTS059 Music and Media Computing

Learning Outcomes	Students will acquire technical and aesthetic knowledge regarding the process of developing a multimedia environment for artistic and/or research purposes. At the end of the course, students are capable of authoring a independent project using the Max software.
Contents	This course focuses on programming within the Max 7 programming environment. Students explore and master the different functions and will learn how to write patches using MIDI, audio and video Max objects. Depending on the student's goals for the course, the projects result in either an artistic venture (i.e. an interactive compositional multimedia system), or a software used for Musicology Research (i.e. an interface for collecting participant data within a music perception research study).
Modes of study	Lectures; Demonstrations; Peer-review; self-reflection
Completion modes	Small weekly assignments; Two independent large projects
Learning Materials	• Max Software Built-in Tutorials • Videos on programming with Max from www.cycling74.com
Scheduling	3rd semester
Assessment	0-5

ELECTIVE COURSES WITH MPT COURSE CODES

MMTS063 Music Psychology Training Colloquium	
Learning Outcomes	Students will acquire technical and aesthetic knowledge regarding the process of developing a multimedia environment for artistic and/or research purposes. At the end of the course, students are capable of authoring a independent project using the Max software.
Contents	Students update each other on the progress of their Masters' theses through presentations, discussion and demonstrations. On occasion, guest presenters or department visitors will also give presentations
Modes of study	Presentations, Demos and Group Discussion
Completion modes	Minimum 1 presentation per semester; peer-evaluation and written feedback on content and presentation style; Thesis development journal
Learning Materials	• Karten, N. (2010). Presentation Skills for Technical Professionals: Achieving Excellence. IT Pro. IT Governance.
Scheduling	3rd & 4th semester
Assessment	Pass or Fail

MMTS156 Music & Neuroscience (3 credits)	
Learning Outcomes	The course is aimed at giving an overview of the current knowledge on how music is processed in the brain and how musical experience shapes brain maturation. During the course, students will gain first-hand experience in conducting an EEG experiment and learn how brain responses related to sound processing can be extracted from EEG data.
Contents	The course is meant as an introduction to some of the central themes in cognitive neuroscience of music. The lectures will cover 1) the major brain research methods used to study music processing, 2) the neural basis of music perception and music-induced emotions, 3) the development of music processing during childhood, and 4) the neuroplastic effects of musical training. In the workshop, students will collect and analyze electroencephalography (EEG) data.
Modes of study	Presentations, Demos and Group Discussion
Completion modes	Exam; learning diary
Learning Materials	• Teacher generated materials
Scheduling	2nd or 3rd semester
Assessment	0-5

RECOMMENDED ELECTIVE COURSES FROM OTHER UNITS

- Contemporary Issues in Musicology (MUSS851, 3)
- Approaches and Methods in Music Therapy (MTEM031,5)
- Music Therapy in Medicine and as Rehabilitation (MTEM020, 5)
- Perspectives on Psychiatry and Psychotherapy (MTEM030, 5)
- Suomi 3 (5) etc. (recommended for students wishing to stay in Finland)
- or: Minor in Cognitive Neuroscience, if available (30 ECTS; students may replace research methodology credits with credits earned from Minor in Cognitive Neuroscience)

Learning outcomes: Vary.

Contents: Vary

Modes of study: Vary

Completion modes: Vary

Learning Materials: Vary

Scheduling: 3rd Semester

Assessment: 0-5

COMMUNICATION & LANGUAGE REQUIREMENTS

LANGUAGE REQUIREMENTS (10 ECTS)

The MMT Programme includes a compulsory language course for all students, XENX009 Research Communication Skills (5 ECTS), which consists of writing skills and oral presentation skills and is integrated within the Seminar course. In addition, students with native language other than Finnish are required to pass the first two course levels in Finnish (i.e. XSU0005 Suomi 1 & XSU0006 Suomi 2). Further, it should be noted that Finnish students must fulfil the statutory requirements in Finnish and in Swedish if they wish to be qualified for civil servant (state) positions in Finland. These studies in Finnish and Swedish are integrated to the 120 ECTS MMT studies.

MATURITY EXAMINATION (MUS0Y96, 1 ECTS)

The maturity examination (in Finnish 'kypsyysnäyte' or 'maturiteetti') is a compulsory study attainment stipulated in the Degree Statute. According to the Statute, students have to complete a maturity examination in the field of their thesis. The maturity examination makes up part of the compulsory language and communication studies of the Programme. The maturity examination is an essay-type paper, which assesses both the student's mastery of the subject and his/her language ability. Further information on the maturity exam is available from: http://www.jyu.fi/hum/en/study/maturityexam

ADDITIONAL STUDY OPTIONS

MINOR IN COGNITIVE NEUROSCIENCE (30 ECTS)

The Centre for Interdisciplinary Brain Research (CIBR) offers a Minor degree to students interested in pursuing neuroscience studies. Students must complete 30 credits from the curriculum defined by the CIBR. Participation will be determined at the time when students devise a personal study plan in September 2016.