



International Master's Degree programme in Wireless Communication Engineering (WCE)

WCE program's M.Sc. degree consist of 120 ECTS credits of studies from the modules described below (44 + 33 + 10 + 3 + 30 = 120). 60 ECTS credits measure the workload of a full-time student during one academic year, which equals around 1500-1800 hours per year. Thus one ECTS credit stands for 25-30 working hours. The structure of WCE studies is organized in the following manner:

Basic WCE studies module (44 ECTS)
Advanced WCE studies module (33 ECTS)
Optional EE and CE courses module (≥ 10 ECTS)
Practical training (3 ECTS)
M.Sc. (Diploma) Thesis work (30 ECTS)
In total 120 ECTS

ECTS = European Credit Transfer System, 1 credit 25-30 hours, 1 year ca. 60 credits

Teaching is given within the basic, advanced and optional modules. All courses within the basic and advanced modules must be completed. There is freedom to choose courses from the optional module. At least 13 ECTS of optional studies must be completed. All WCE courses described below are implemented in English.

Other B.Sc. and M.Sc. level courses taught in Finnish in electrical engineering (EE) and information engineering (IE) programs of the department cannot be included into your WCE M.Sc. degree. Of course, you are free to listen and pass such courses, but those Finnish courses cannot be included into your curriculum.

Exams for those Finnish courses are typically delivered in English based on student's special request in WebOodi (<https://weboodi oulu.fi/oodi/frame.jsp?Kieli=6>). The complete list of B.Sc. and M.S. level courses offered by the EIE department in Electrical Engineering (EE), Information Engineering (IE), and Wireless Communication Engineering (WCE) programs can be found from here:

<http://www.ee oulu.fi/Opiskelijat/KurssitJaTentit/Kurssiluettelo>



If a student fails to pass an exam, she/he can try again in next exam of a given course. Typically 3-4 exams are arranged per year for each course. Notice, no restrictions are imposed on the number, and time-span of taken exams for each course at the EIE department, i.e. if you fail an exam, you can retry during next exams and study years. Also, if you are not satisfied with your grade, you can try to rise your grade during next exam.

A study year at our EIE department is divided into 6 periods. Periods 1, 2 and 3 run during autumn (A) term, and periods 4, 5 and 6 run during spring (S) term. Time span for each period is 5 weeks. Thus, each study year consists of 30 weeks of teaching. Between 3rd and 4th periods there is a three week holiday season for Christmas & New Year. No teaching and exams are arranged during that holiday season.

The exact dates for the periods of study year 2011-2012 are: 1st: 5.9.-7.10.2011, 2nd: 10.10.-11.11.2011, 3rd: 14.11.-16.12.2011, 4th: 9.1.-10.2.2012, 5th: 13.2.-23.3.2012, 6th: 26.3.-4.5.2012.

University of Oulu orientation program for all international master's degree students is arranged during September 5-7, 2011 (week 36). It is recommend that you will arrive to Oulu before the orientation program. After orientation starts the 1st period of study year 2011-2012.

Curriculum Schedule for WCE Students Starting in September 2011 (Student Group 2011-2013):

At the beginning of studies in early September 2011 WCE students have to participate in the course entitled *521481P Introduction to the Use of Workstation* (1 ECTS, period 1) taking only few hours, in order to get user ID, and password for computers of the department. Dates for that course will be informed in September. Those computers are needed in exercise/design works for courses of WCE curriculum. You will also get your own personal e-mail adress for university's servers.

Basic module (all courses obligatory)	ECTS	Suggested study year	Precise course timing	Lecturer
Basics for Information theory *	4	1	A2011 (per. 1-2)	Prof. Markku Juntti
Coding Methods *	4	1	S2012 (per. 4-5)	Sen. Ass. Timo Kokkonen
Mobile Telecommunication Systems	5	1	S2012 (per. 4-6)	Prof. Marcos Katz
Wireless Communications II	8	1	A2011 (per. 1-3)	Prof. Jari Iinatti
Communication Networks I	5	1	A2011 (per. 1-3)	Prof. Savo Glisic
Seminar in Telecom. & Radio Engineering	1	2	A2012–S2013 (per. 1-6)	Prof. Jari Iinatti
Communication Signal Processing I	6	1	S2012 (per. 4-5)	Prof. Markku Juntti
Introduction to Optimization	5	1	A2011 (per. 1-3)	Prof. Keijo Ruotsalainen
Radio Engineering I	6	2	A2011 (per. 1-3)	Sen. Ass. Risto Vuhtoniemi
total	44			

* These courses will merge into a new course entitled *Basics for Information Theory and Coding* (5 ECTS, per. 1-2) during the academic year 2012-2013 (for students who will start their studies in autumn 2012).



Advanced module (all courses obligatory)	ECTS	Suggested study year	Precise course timing	Lecturer
Communication Networks II	7	1	S2012 (per. 4-6) *	Prof. Savo Glisic
Radio Engineering II	5	1	S2012 (per. 4-6) *	Sen. Ass. Risto Vuohtoniemi
Wireless Communications III	8	2	S2013 (per. 4-6) #	Prof. Matti Latva-aho
Communication Signal Processing II	4	2	S2013 (per. 5-6) #	Prof. Jari Iinatti
Antennas	4	1	S2012 (per. 4-6) *	Sen. Ass. Seppo Karhu
Radio Channels	5	2	S2013 (per. 4-6) #	Sen. Ass. Seppo Karhu
total	33			

* = lectured only on even years 2012, 2014, 2016,

= lectured only on odd years 2011, 2013, 2015, ...

With the elective courses of an optional module a student can extend his/her knowledge from wireless communications into the areas of practical electronics design, computer engineering, computer networking, multimedia, and software related issues. Notice there are some recommendations depending on your interests. You are anyway free to choose the elective courses you like. You have to choose at least 13 ECTS of elective courses. Study year suggestions of optional courses are based on the prerequisite course knowledge.

Optional Module (courses can be chosen freely)	ECTS	Suggested study year	Precise course timing	Lecturer
Electronics Design II	5	1	A2011 (per. 1-2) ♠	Dos. Tarmo Ruotsalainen Prof. Juha Kostamovaara
Laboratory Exercises on Analogue Electronics	3	1	S2012 (per. 4-6) ♠	Prof. Kari Määttä
Multimedia Systems	6	2	A2012 (per. 2-3) ♣	Prof. Mika Ylianttila
Modern Topics in Telecommunications and Radio Engineering *	3-7	1,2	annually *, (per. 1-6) ♥	Prof. Pentti Leppänen
Computer Networks I	5	1	S2012 (per. 5-6) ♠, ♣	Prof. Timo Ojala
Computer Networks II	6	2	A2012–S2013 (per. 3-4) ♣	Prof. Timo Ojala
Telecommunications Software	5	2	S2013 (per. 4-5) ♣	Dr. Junzhao Sun
Distributed Systems	4	2	S2013 (per. 4-5) ♣	Prof. Timo Ojala
at least 10 ECTS must be chosen from these courses	≥10			

* = Exact topics will be announced yearly. During autumn 2011 a course entitled “*Multiuser Communication in Wireless Networks*” is lectured. Notice, you can choose several course topics under this “umbrella” course title.

♥ = This course is recommended for all WCE students.

♠ = If you are interested in both electronics design and basics of computer networks issues, these courses are recommended.

♣ = If you are interested in computer engineering issues to widen your expertise, a proper collection of these courses are recommended.

Other obligatory studies included in WCE master's degree	ECTS	Suggested study year	Precise timing
Practical training (includes also a written training report for the EIE department)	3	1-2	2 months of workload equals 3 ECTS; either in summer 2012 or in summer 2013
Diploma Thesis (M.Sc. thesis)	30	2	A2012–S2013
total	33		