

## International Master’s Degree (Tech.) Programme in Wireless Communications Engineering (WCE)

Two Years, 120 ECTS credit points

WCE curriculum is mainly organized by ITEE Faculty’s

- CWC Radio Technologies (CWC-RT) research unit
- CWC Networks and Systems (CWC-NS) research unit
- Circuit and Systems (CAS) research unit

WCE study specialization options (can be chosen freely after admission in student’s personal study plan):

- Wireless Communications Engineering – Radio Access and Networks (WCE–RAN)
- Wireless Communications Engineering – RF Engineering (WCE–RF)

Each academic study year is divided into two terms (Fall and spring) and four periods.

### Course Structure Diagram 2017-2019

Wireless Communications Engineering – Radio Access and Networks WCE–RAN study option									
Code	Course name and credits	Suggested timing							
		1. year				2. year			
		1. Fall		1.Spring		2. Fall		2. Spring	
		1	2	3	4	1	2	3	4
<b>Obligatory Basic Studies Total 40 ECTS</b>									
<a href="#">031025A</a>	Introduction to Optimization	5							
<a href="#">521484?</a>	Statistical Signal Processing	5							
<a href="#">521316S</a>	Broadband Communications Systems	5							
<a href="#">521340S</a>	Communication Networks I		5						
<a href="#">521321S</a>	Elements of Information Theory and Coding		5						
<a href="#">521323S</a>	Wireless Communications I		5						
<a href="#">521324S</a>	Communication Signal Processing I			5					
<a href="#">521385S</a>	Mobile Telecommunication Systems			5					
<b>Obligatory Advanced Studies Total 25 ECTS</b>									
<a href="#">521317S</a>	Wireless Communications II			8					
<a href="#">521377S</a>	Communication Networks II			7					
<a href="#">521325S</a>	Communication Signal				5				

	Processing II								
<a href="#">521326S</a>	Radio Engineering I						5		
<b>Other Obligatory Studies Total 33 ECTS</b>									
<a href="#">521016A</a>	Advanced practical training						3		
<a href="#">521998S</a>	Master's Thesis						5		25
<b>Obligatory Studies Total 98 ECTS</b>									
		30	30				13		25
		60				38			
<b>Elective Studies Total ECTS</b>		22							
<b>Master's Degree Total ECTS</b>		120							
Students should choose elective studies in order to fit closely to 30 credits per spring and fall terms and total 120 credits for the whole master's degree. At least 22 ECTS of optional studies are needed for WCE-RAN study option.									
Elective studies of the optional module are recommended for the second study year to keep balance of workload for two study years. Elective studies must be filled in for student's personal study plan which is created when starting WCE studies, and it is accepted by student's personal study advisor (programme's coordinator).									
<b>Elective Courses of Optional Module Total 22 ECTS (at least)</b>									
Code	Course name and credits	Suggested timing							
		1. Fall		1.Spring		2. Fall		2. Spring	
		1	2	3	4	1	2	3	4
<a href="#">900017Y</a>	Survival Finnish Course (1)	2				2			
<a href="#">900013Y</a>	Beginner's Finnish Course I (1)	3				3			
<a href="#">900053Y</a>	Beginner's Finnish Course II (1)			5		5		5	
<a href="#">521386S</a>	Radio Channels (odd yrs) (2)								5
<a href="#">521388S</a>	Antennas (even yrs) (3)				5				
<a href="#">521318S</a>	Modern Topics in telecommunications and Radio Engineering	3-7							
<a href="#">521322S</a>	Telecommunication engineering project					5			
<a href="#">521225S</a>	RF Components and Measurements								4
<a href="#">521097S</a>	Wireless Measurements							5	
521xxxS	Electronic System Design					5			
521xxxS	Communications Circuit Design					5			
<a href="#">521443S</a>	Electronics Design II					6			
<a href="#">521435S</a>	Electronics Design III						5		
<a href="#">521300S</a>	Electronics Design and Construction Exercise					5			
<a href="#">813621S</a>	Research Method					5			
<a href="#">521273S</a>	Biosignal Processing I						5		
<a href="#">521259S</a>	Digital Video Processing					5			
<a href="#">521145A</a>	Human Computer Interaction						5		
<a href="#">521279S</a>	Signal Processing Systems					5			
<a href="#">521148S</a>	Ubiquitous Computing Fundamentals					5			
<a href="#">521281S</a>	Application Specific Signal Processors					5			
<a href="#">521493S</a>	Computer Graphics								7

<a href="#">521290S</a>	Distributed Systems								5	
<a href="#">521466S</a>	Machine Vision								5	
<a href="#">521147S</a>	Mobile and Social Computing								5	
<a href="#">521260S</a>	Programmable Web project								5	
<a href="#">521479S</a>	Software Project						7			
<p>(1) Finnish language studies can be taken either on 1<sup>st</sup> or 2<sup>nd</sup> study year depending on student's study plan. Finnish language courses can be included at most 10 ECTS credits.</p> <p>(2) Organized on odd years 2017, 2019,...</p> <p>(3) Organized on even years 2018, 2020,...</p> <p>Either Antennas or Radio Channels course is recommended as an elective course for WCE-RAN study option students.</p>										
<b>Wireless Communications Engineering – RF Engineering WCE–RF Study Option</b>										
Code	Course name and credits	Suggested timing								
		1. year				2. year				
		1. Fall	1.Spring	2. Fall	2.Spring					
		1	2	3	4	1	2	3	4	
<b>Obligatory Basic Studies Total 41 ECTS</b>										
<a href="#">521443S</a>	Electronics Design II	6								
<a href="#">521484?</a>	Statistical Signal Processing	5								
<a href="#">521316S</a>	Broadband Communications Systems	5								
<a href="#">521326S</a>	Radio Engineering I		5							
<a href="#">521323S</a>	Wireless Communications I		5							
<a href="#">521324S</a>	Communication Signal Processing I			5						
<a href="#">521225S</a>	RF Components and Measurements				5					
521xxxS	Electronic System Design					5				
<b>Obligatory Advanced Studies Total 31 ECTS</b>										
<a href="#">521435S</a>	Electronics Design III		5							
<a href="#">521327S</a>	Radio Engineering II			6						
<a href="#">521386S</a>	Radio Channels (odd yrs) (4), (5)									5
<a href="#">521388S</a>	Antennas (even yrs) (4), (6)				5					
521xxxS	Communications Circuit Design					5				
<a href="#">521322S</a>	Telecommunication engineering project (7)						5			
<a href="#">521300S</a>	Electronics Design and Construction Exercise (7)						5			
<p>(4) One of these courses, Antennas or Radio Channels is obligatory for WCE–RF study option, and it must be selected into advanced studies module, and the other one can be placed into optional studies module if student wish to take it on second year.</p> <p>(5) Organized on odd years 2017, 2019,...</p> <p>(6) Organized on even years 2018, 2020,...</p> <p>(7) One of these courses, Telecommunication engineering project or Electronics Design and Construction Exercise is obligatory for WCE-RF study option, and it must be selected into advanced studies module, and the other one can be placed into optional studies module if student also wish to take it on second year.</p>										

<b>Other Obligatory Studies Total 33 ECTS</b>									
<a href="#">521016A</a>	Advanced practical training						3		
<a href="#">521998S</a>	Master's Thesis							5	25
<b>Obligatory Studies Total 105 ECTS</b>									
		31		16-21		28		25-30	
		47-52				53-58			
<b>Elective Studies Total ECTS</b>		15							
<b>Master's Degree Total ECTS</b>		120							
Students should choose elective studies in order to fit closely to 30 credits per spring and fall terms and total 120 credits for the whole master's degree.									
Elective studies of the optional module are recommended for the second study year to keep balance of workload between study years.									
<b>Elective Courses of Optional Module Total 15 ECTS (at least)</b>									
Code	Course name and credits	Suggested timing							
		1. year				2. year			
		1. Fall		1.Spring		2. Fall		2.Spring	
		1	2	3	4	1	2	3	4
<a href="#">900017Y</a>	Survival Finnish Course (1)	2				2			
<a href="#">900013Y</a>	Beginner's Finnish Course I (1)		3				3		
<a href="#">900053Y</a>	Beginner's Finnish Course II (1)			5				5	
<a href="#">521386S</a>	Radio Channels (odd yrs) (2)								5
<a href="#">521388S</a>	Antennas (even yrs) (3)				5				
<a href="#">521097S</a>	Wireless Measurements							5	
<a href="#">521318S</a>	Modern Topics in telecommunications and Radio Engineering	3-7							
<a href="#">521385S</a>	Mobile Telecommunication Systems							5	
<a href="#">521317S</a>	Wireless Communications II								8
<a href="#">521377S</a>	Communication Networks II								7
<a href="#">521325S</a>	Communication Signal Processing II								5
<a href="#">813621S</a>	Research Method					5			
<a href="#">521273S</a>	Biosignal Processing I						5		
<a href="#">521259S</a>	Digital Video Processing					5			
<a href="#">521145A</a>	Human Computer Interaction						5		
<a href="#">521279S</a>	Signal Processing Systems					5			
<a href="#">521148S</a>	Ubiquitous Computing Fundamentals					5			
<a href="#">521281S</a>	Application Specific Signal Processors					5			
<a href="#">521493S</a>	Computer Graphics								7
<a href="#">521290S</a>	Distributed Systems							5	
<a href="#">521466S</a>	Machine Vision							5	
<a href="#">521147S</a>	Mobile and Social Computing								5
<a href="#">521260S</a>	Programmable Web project								5
<a href="#">521479S</a>	Software Project					7			