WCE CURRICULUM CONTENT

MODULES & COURSES & TIMING

Admission Group 2017-2019
WCE Curriculum

• 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 after admission at the beginning of studies in August):
  • Wireless Communications Engineering – Radio Access and Networks (WCE–RAN)
  • Wireless Communications Engineering – RF Engineering (WCE–RF)

# Application and acceptance for RF Engineering study option for students personal study plan will be done after WCE orientation programme in August. Acceptance for the RF Engineering study option is based on student’s background resulting from his/her Bachelor's or equivalent studies, i.e., depending on relevant courses done in subjects of electronics, RF techniques, measurements, and electromagnetics, etc. making student capable to manage for WCE-RF study option. It is important to notice that mandatory courses of one specialization option can be taken as elective courses in other option, if a student wish to broaden his/her expertise into the area of other study option.
# WCE Contents

<table>
<thead>
<tr>
<th>Module</th>
<th>ECTS</th>
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<tbody>
<tr>
<td>Basic WCE studies module (RAN: 40, RF: 41)</td>
<td>41</td>
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<tr>
<td>Advanced WCE studies module (RAN: 25, RF: 31)</td>
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<td>Optional WCE studies module (RAN: ≥ 22, RF: ≥15)</td>
<td>≥15</td>
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<tr>
<td>Advanced practical training (3)</td>
<td>3</td>
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<tr>
<td>Master’s (Diploma) Thesis work (30)</td>
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In total 120 ECTS

University of Oulu holds ECTS label certificate

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

• WCE output: *R&D professionals specialized in wireless radio system design*
  – in RF engineering (RF option) or
  – in physical and network layers (radio access and networks RAN option)

• Learning outcomes of WCE M.Sc.(Tech.) graduates\(^1\):  
  – Mathematics of optimization
  – Statistical signal processing
  – Communications signal processing
  – Information theory & coding methods
  – Communications network theory
  – Future radio access technologies (5G, etc.)
  – Mobile cellular communication systems design
  – Radio channels
  – Antenna & radio frequency engineering
  – Several computer engineering, DSP and multimedia subjects
  – Electronics design courses
  – Finnish language studies in order to integrate with Finnish society

\(^1\) Depending on the selected option and optional studies
WCE–RAN Schedule — 1st Year

Autumn 2017
Periods 1-2

- Introduction to Optimization (5 cr, 1 p)
- Communications Networks I (5 cr, 2 p)
- Statistical Signal Processing (5 cr, 1 p)
- Elements of Information Theory and Coding (5 cr, 2 p)
- Broadband Communications Systems (5 cr, 1 p)
- Wireless Communications I (5 cr, 2 p)

Spring 2018
Periods 3-4

- Wireless Communications II (8 cr, 3-4 p)
- Communications Networks II (7 cr, 3-4 p)
- Commun. Signal Processing I (5 cr, 3 p)
- Mobile Telecommunication Systems (5 cr, 3p)
- Commun. Signal Processing II (5 cr, 4 p)
- Advanced Practical Training (3 cr)
  (recommended in summer 2018, training report will be done on autumn 2018 term)

- Finnish Language studies (2-5 cr) and/or optional studies depending on personal workload

Basic Studies
Advanced Studies
Optional Studies
WCE–RAN Schedule — 2nd Year

Autumn 2018
Periods 1-2

- Optional Course
- Radio Engineering I (5 cr, 2 p)
- Optional Course
- Optional Course

Spring 2019
Periods 3-4

- Diploma (M.Sc.) Thesis Work (30 cr, 2-4 p)
- Finnish Language studies (2-5 cr) and/or optional studies to fulfil 120 ECTS requirement

Basic Studies
Advanced Studies
Optional Studies
WCE–RF Schedule — 1st Year

Autumn 2017
Periods 1-2

- Electronics Design II (6 cr, 1 p)
- Electronics Design III (5 cr, 2 p)
- Commun. Signal Processing I (5 cr, 3 p)
- Statistical Signal Processing (5 cr, 1 p)
- Radio Engineering I (5 cr, 2 p)
- Broadband Communications Systems (5 cr, 1 p)
- Wireless Communications I (5 cr, 2 p)

Spring 2018
Periods 3-4

- RF Components and Measurements (5 cr, 4 p)
- Radio Engineering II (6 cr, 3 p)
- Radio Channels (5 cr, 4 p) or Antennas (5 cr, 4 p)
- Optional Course

Finnish Language studies (2-5 cr) and/or optional studies depending on personal workload

Basic Studies
Advanced Studies
Optional Studies
WCE–RF Schedule — 2nd Year

Autumn 2018
Periods 1-2

Electronic System Design (5 cr, 1 p)

Communications Circuit Design (5 cr, 1 p)

Optional Course

Optional Course

Telecommunication Engineering Project (5 cr)

or

Electronics Design and Construction Exercise (5 cr, 1-2 p)
(either one of these is mandatory)

Diploma (M.Sc.) Thesis Work (30 cr, 2-4 p)

Finnish Language studies (2-5 cr) and/or optional studies to fulfill 120 ECTS requirements

Spring 2019
Periods 3-4

Basic Studies

Advanced Studies

Optional Studies

CWC
CENTRE FOR WIRELESS COMMUNICATIONS
University of Oulu

UNIVERSITY OF OULU