Overview of the *Electrical and Computer Engineering* Graduate Programs

- Core Research Areas
- Graduate Curriculum Course Credit Requirements
- PhD Candidacy Exam and Milestones
- Forms

Spring of 2021

UNIVERSITY of DAYTON

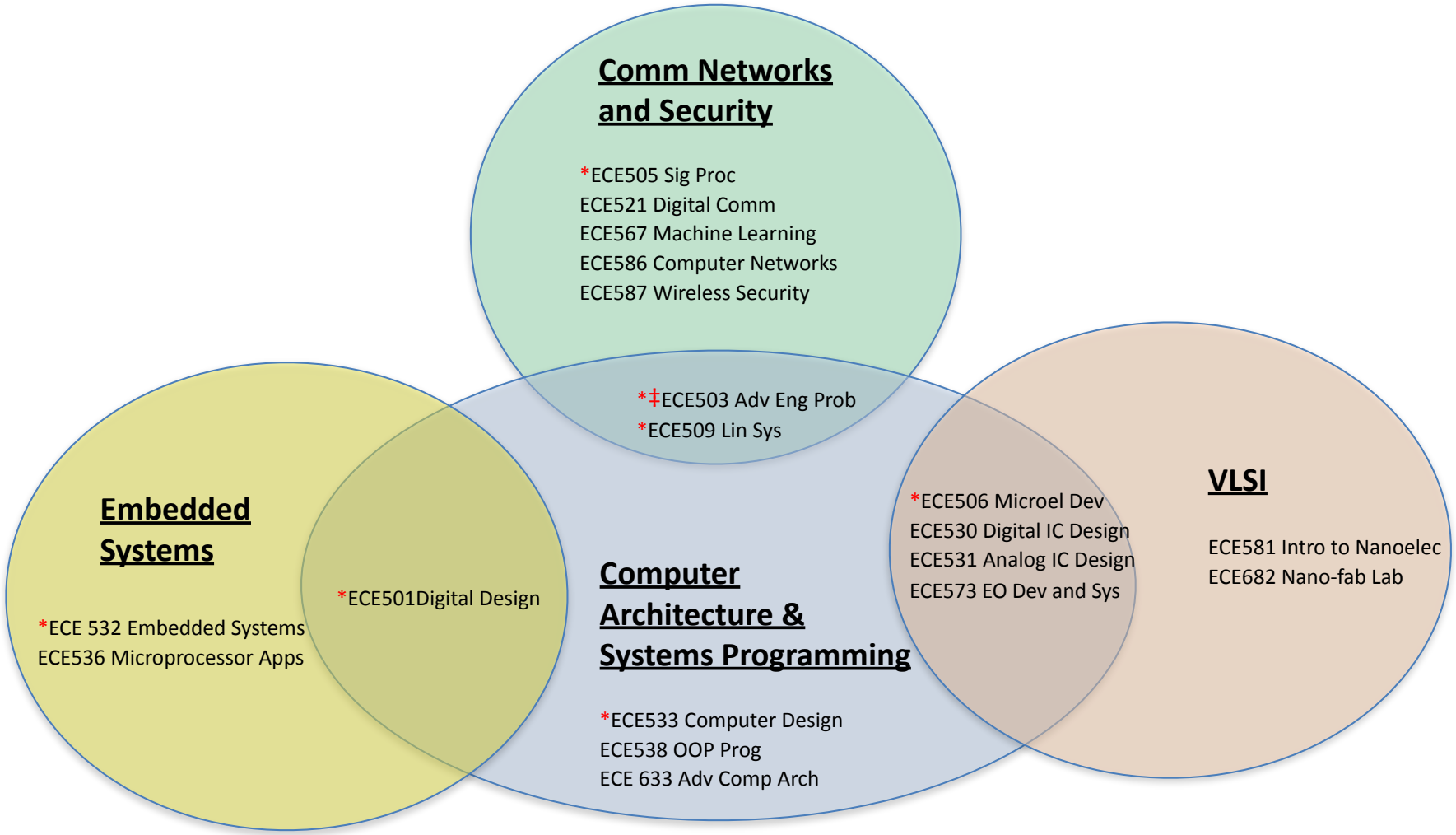
Core Research Areas

Conceptual Organization into Core Research Areas

- *Main core areas* of expertise in the ECE department:
- MS ELE
  - ➡ Computing Systems area
  - ➡ Sensors and Devices area
  - ➡ Signals and Systems area
- MS CPE
  - ➡ Programming Systems area
  - ➡ Computing and Networking Systems area
- Venn diagram organization of courses, sub-areas
- Gives a quick view of the department, curriculum and research

ELE - Computing Systems

Spring 2021

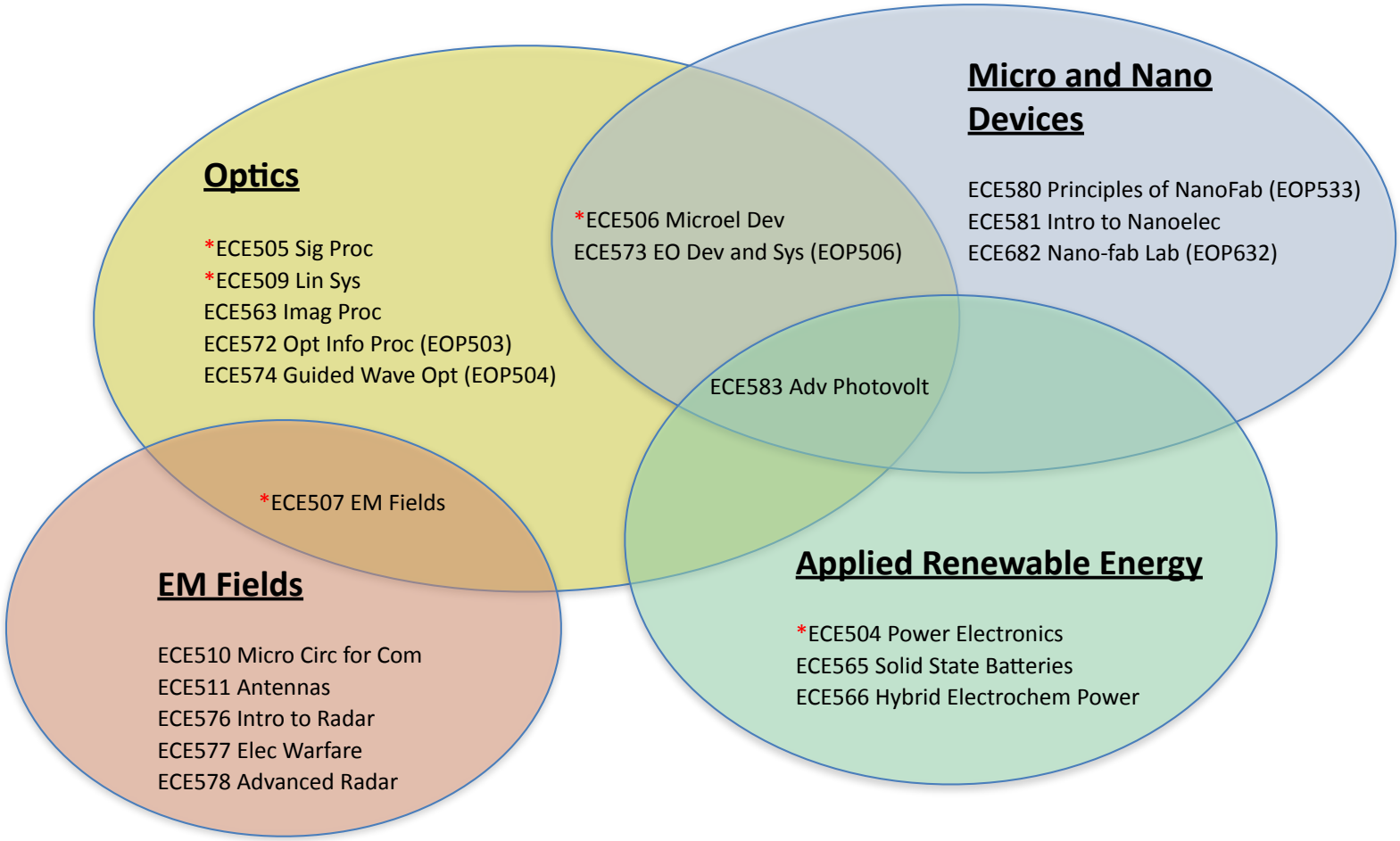


* *ELE core courses*

‡ *PhD math courses*

ELE - Sensors and Devices

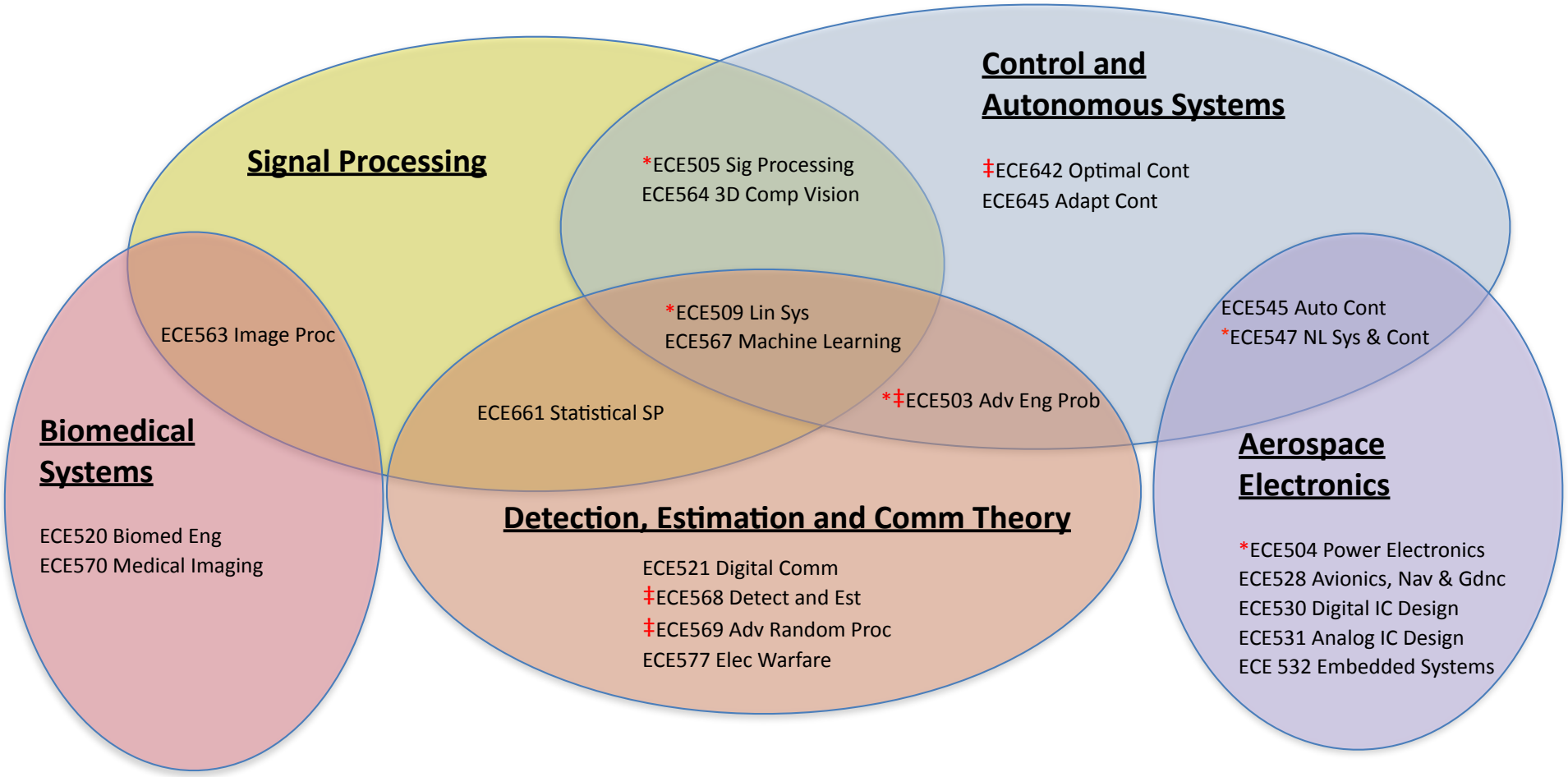
Spring 2021



* *ELE core courses*

ELE- Signals and Systems

Spring 2021

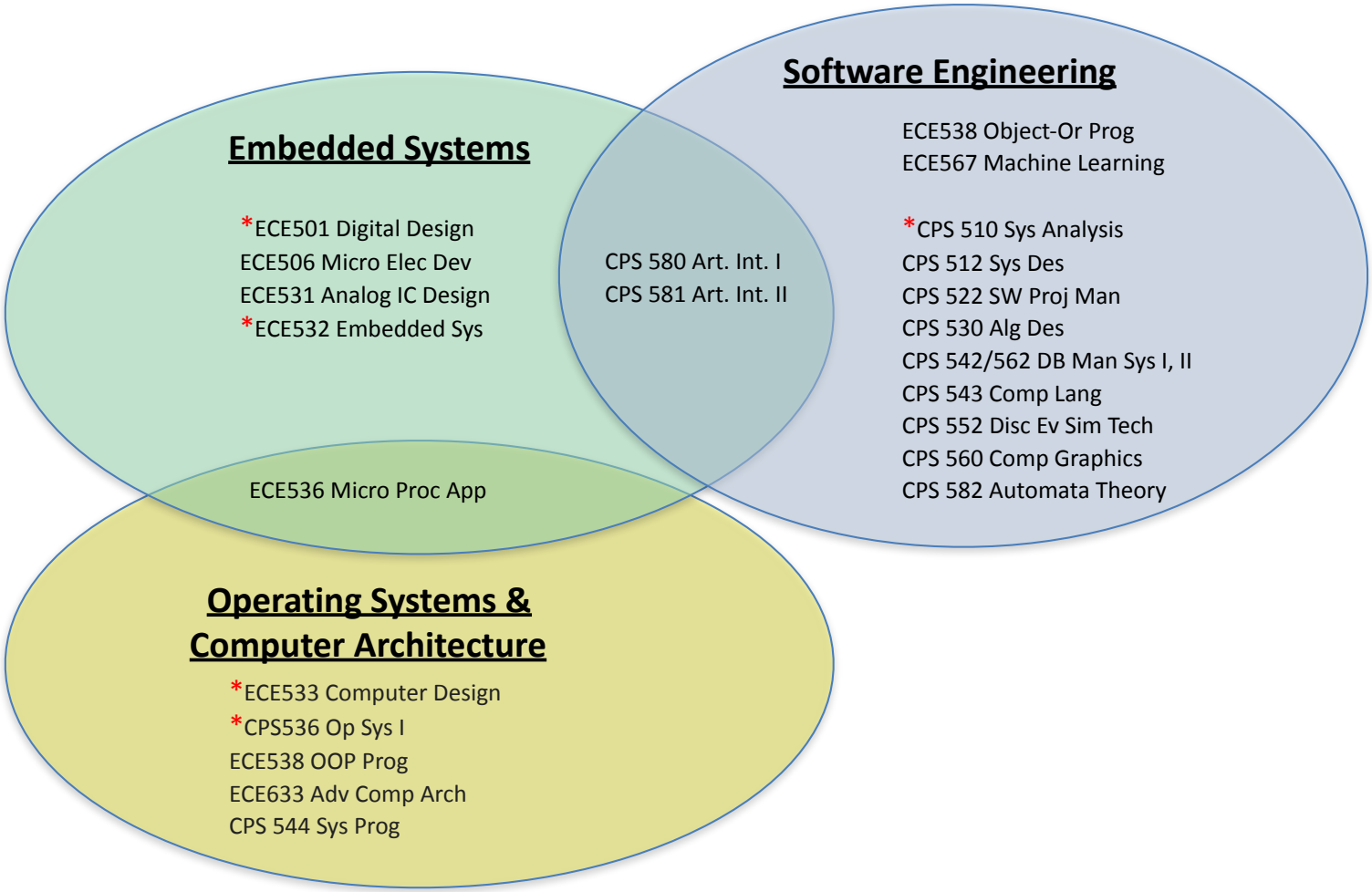


* *ELE core courses*

‡ *PhD math courses*

MSCPE - Programming Systems

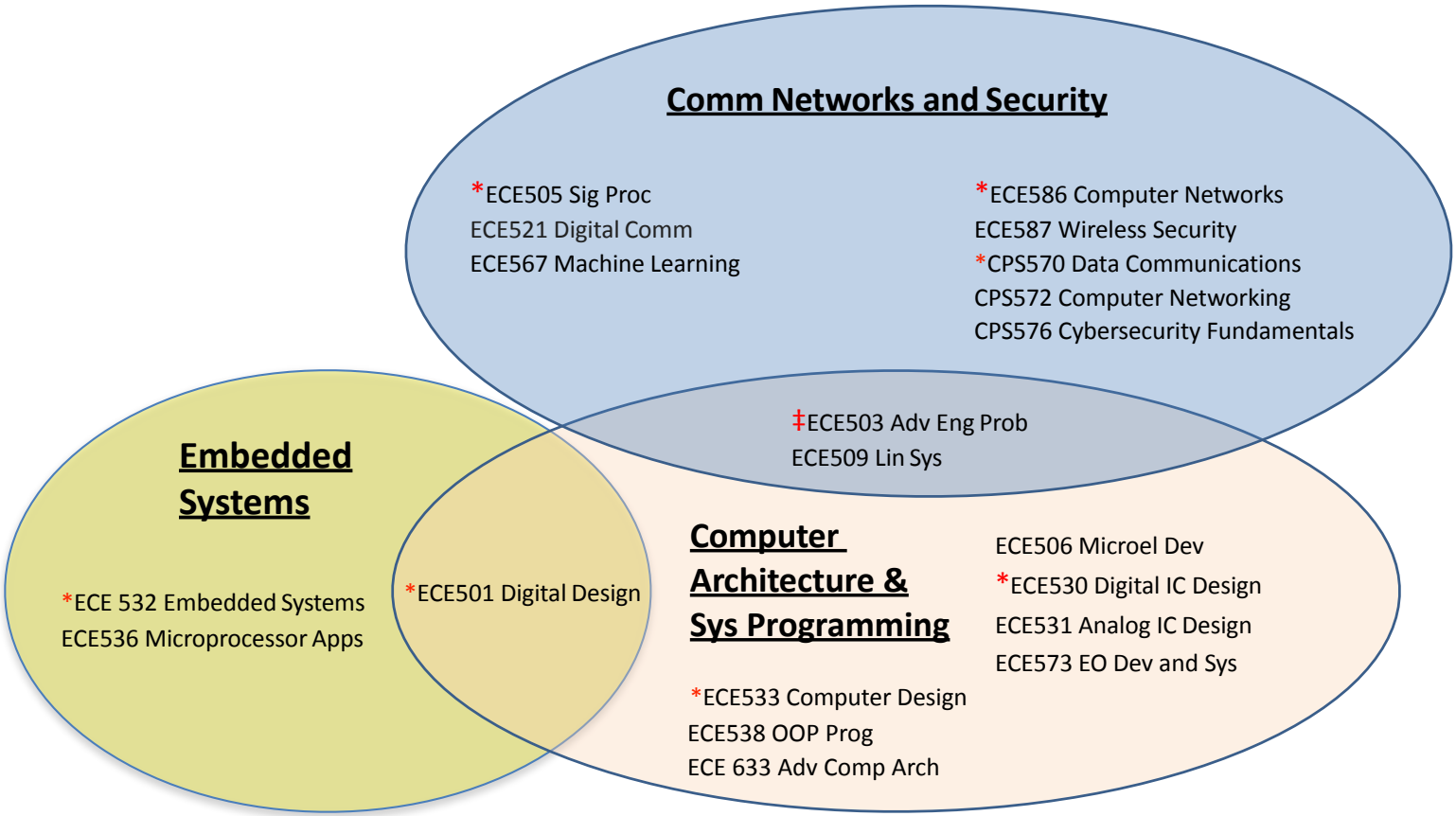
Spring 2021



* *CPE core courses*

MSCPE - Computing and Networking Systems

Spring 2021



* *CPE core courses*

‡ *PhD math courses*

	Course	Name	FA18	SP19	SU19	FA19	SP20	SU20	FA20	SP21	SU21	FA	SP	SU
1	ECE 500	Into Grad Prog ECE	x	x		x	x		x	x		x	x	
2	ECE 501	Contmp Dig Sys	x		x	x		x	x		x	x		x
3	ECE 503	Adv Eng Prob	x			x			x			x		
4	ECE 505	Digital Signals Processing I	x		x	x		x	x		x	x		x
5	ECE 506	Microelec Dev		x			x			x			x	
6	ECE 507	Electromag Fields	x			x			x			x		
7	ECE 509	Analy-Lin Sys		x	x		x	x		x	x		x	x
8	ECE 510	Micro Circ for Com					x			x			x	
9	ECE 511	Antennas	x			x			x					
10	ECE 521	Digital Comm I		x			x			x			x	
11	ECE 523	Sat Comm												
12	ECE 528	Avionics, Navigation and Guidance												
13	ECE 530	Digital IC Design	x			x			x			x		
14	ECE 531	Analog IC Design		x			x			x			x	
15	ECE 532	Embedded Systems	x		x	x		x	x		x	x		x
16	ECE 533	Comp Design	x			x			x			x		
17	ECE 536	Microproc Appl					x			x			x	
18	ECE 537	Advanced Software Engineering												
19	ECE 538	Object Oriented Prog		x			x			x			x	
20	ECE 545	Automatic Control			x			x			x			x
21	ECE 547	Nonlin Sys & Control	x			x			x			x		
22	ECE 563	Image Processing		x			x			x			x	
23	ECE 564	3D Comp Vision		x	x		x	x		x	x		x	x
24	ECE 565	Solid State Batteries				x		x	x		x	x		x
25	ECE 566	Hybrid Electrochemical Power					x			x			x	
26	ECE 568	Detection & Estimation								x				
27	ECE 569	Advanced Random Processes					x						x	
28	ECE 567	Machine Learning Pattern	x			x			x			x		
29	ECE 572	Optical Information Processing	x		x	x		x	x		x	x		x
30	ECE 573	Electro-Opt Dev&Sys					x			x			x	
31	ECE 574	Guided Wave Optics		x			x			x			x	
32	ECE 576	Intro to Radar	x			x	x		x	x		x	x	
33	ECE 577	Introduction to Electronic Warefare (EW)	x			x			x			x		
34	ECE 578	Advanced Radar					x			x			x	
35	ECE 580	Principles of Nanofabrication		x			x			x			x	
36	ECE 581	Intro to Nanoelectronics			x		x	x		x	x		x	x
37	ECE 583	Advanced Photovoltaics	x			x			x			x		
38	ECE 586	Computer Networks	x			x			x			x		
39	ECE 587	Wireless Security		x			x			x			x	
39														
40	ECE 595	Internet of Things					x	x		x	x		x	x
41	ECE 595	Intro to Remote Sensing												
42	ECE 595	Medical Imaging					x			x			x	
43	ECE 595	Biomed Eng				x	x		x	x		x	x	
44	ECE 595	Smart Grid Tech (Microgrids?)					x			x			x	
48	ECE 595	Appl. Machine and Deep Learning					x		x			x		
48														
49	ECE 633	Adv Computer Arch					x			x				
50	ECE 642	Optimal Control and Est					x						x	
51	ECE 645	Adaptive Control		x						x				
52	ECE 661	Statistical Signal Processing			x			x			x			x
53	ECE 682	Nano-Fabrication Lab												
54	ECE 696	PhD Seminar	x	x		x	x		x	x		x	x	

Legend
= Planned
= Offered
= Core ELE
= Core CPE
= CPE program
= Not currently offered
x = According to plan

MS Curriculum Requirements

MS Curriculum Requirements

- **ECE 500** must be taken during the first semester of the graduate program.
- Nine semester hours of core courses selected from
  - ELE: ECE 501, 503, 505, 506, 507, 509, 532, 533, 547
  - CPE: ECE 501, 505, 530, 532, 533, 586, CPS 510, CPS 536, CPS 570
- Nine semester hours in an electrical engineering specialization area, such as Computing Systems, Sensors and Devices, Signals and Systems, or any other interdisciplinary area approved by the advisor/Chair.
- Six semester hours in approved basic and engineering science, which may include ECE courses approved by the advisor/Chair.
- Six semester hours of an approved thesis or six semester hours of electrical engineering graduate courses.
- **UD Global students**: must also have UDG 502 Professional Development and Academic Skills (1 credit hour) in your plan of study!

PhD Graduate Curriculum
Course Credit Requirements

PhD: 30 Course Credits Requirements

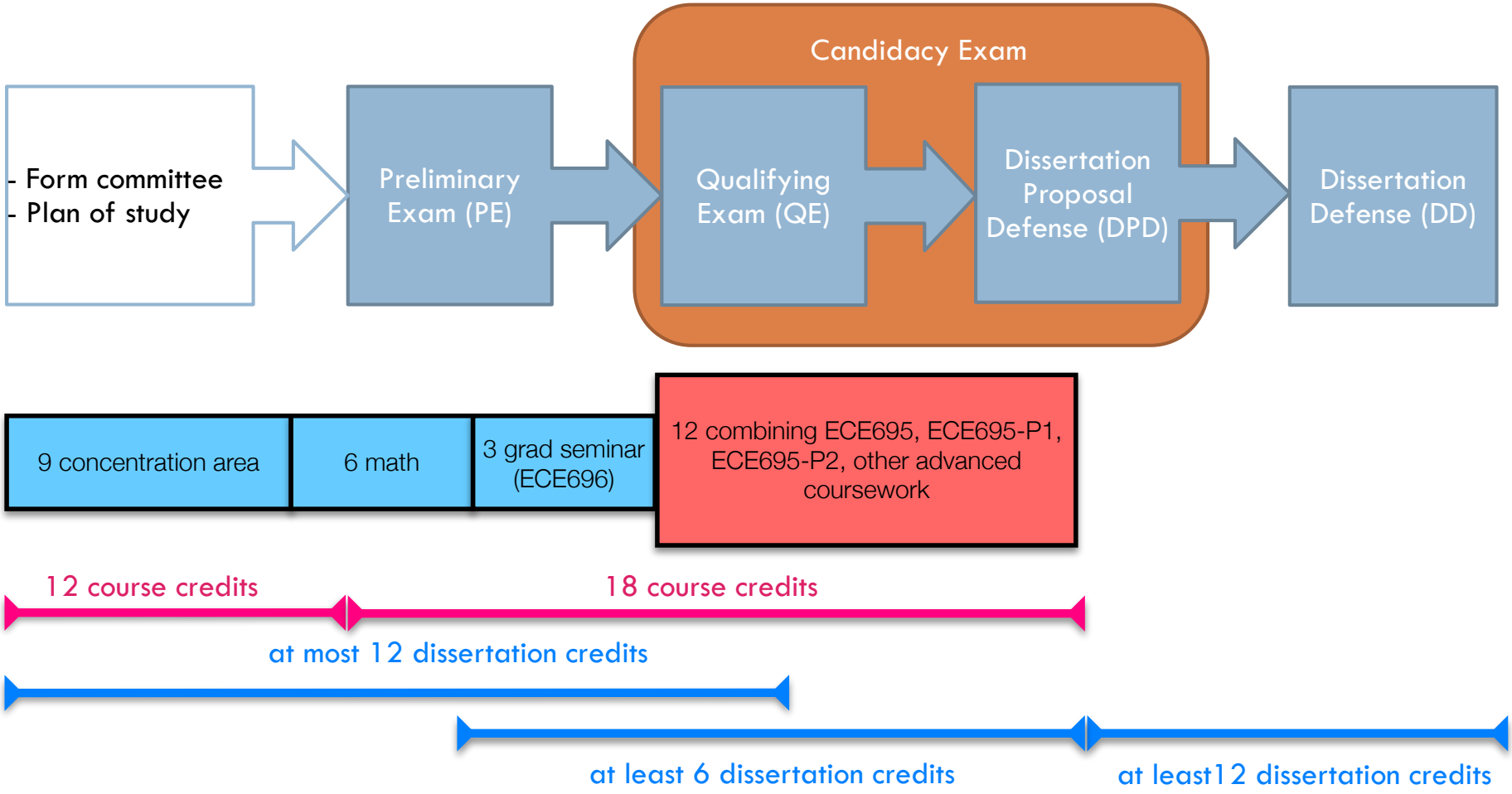
- **Nine** semester hours from an approved concentration area such as Computing Systems, Sensors and Devices, Signals and Systems, or any other interdisciplinary area approved by the advisor/Chair (excludes ECE 695-699)

- At least **six** semester hours of approved graduate mathematics courses (all graduate MTH courses *and ECE 503, ECE 568, ECE 569, ECE 642*)

- At least **three** semester hours of Graduate Seminar (ECE 696)

- The remaining **twelve** credit hours can be any combination of advanced graded course work, Guided Research Leading to Conference Publication (ECE 695-P1), and Guided Research Leading to Journal Publication (ECE 695-P2)

ECE PhD Milestones at a Glance



PhD Preliminary Exam Classes and Math Classes

PhD PE Classes (PECs)

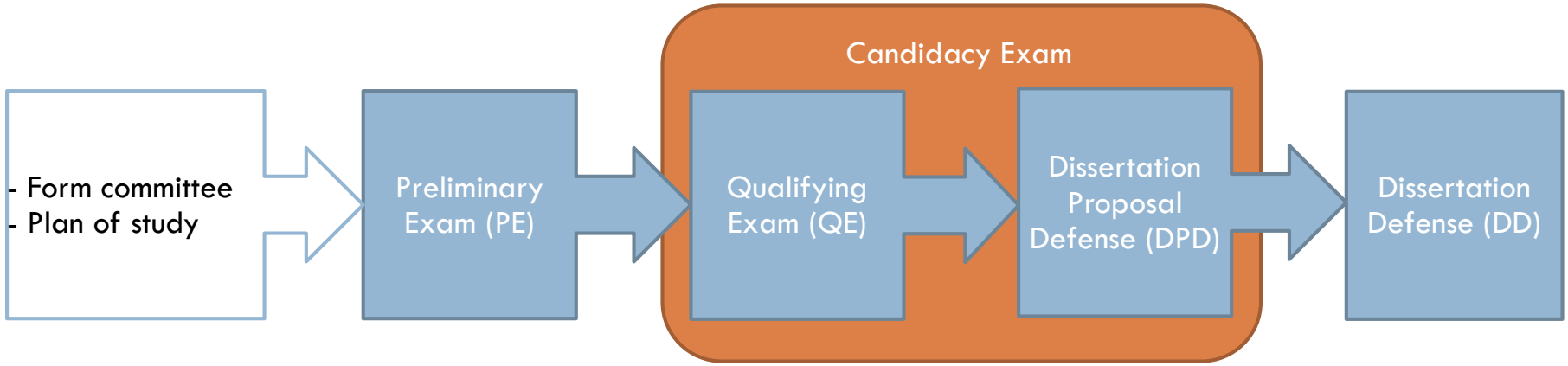
- ECE 501 Digital Design
- ECE 503 Advanced Eng Prob
- ECE 504 Power Electronics
- ECE 505 Signal Processing
- ECE 506 Microelectronic Devices
- ECE 507 EM Fields
- ECE 509 Analysis of Linear Systems
- ECE 511 Antennas
- ECE 520 Biomedical Eng
- ECE 521 Digital Communications
- ECE 530 Digital IC Design
- ECE 531 Analog ID Design
- ECE 532 Embedded Systems
- ECE 533 Computer Design
- ECE 536 Microprocessor Apps
- ECE 547 Nonlinear Sys and Ctrl
- ECE 565 Solid State Batteries
- ECE 566 Hybrid Electrochemical Power
- ECE 567 Machine Learning
- ECE 572 Opt Info Proc (EOP503)
- ECE 586 Computer Networks
- ECE 581 Intro to Nanoelectronics

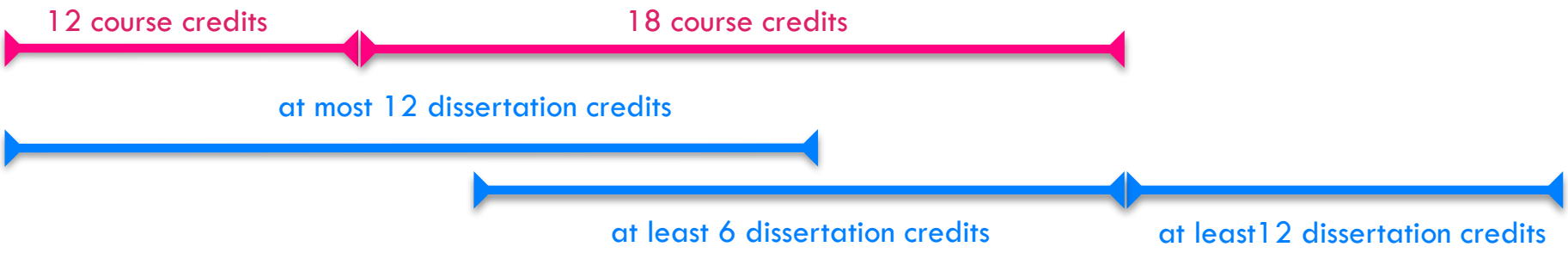
PhD Math Classes from ECE Department:

- ECE 503 Advanced Eng Prob
- ECE 568 Detection and Estimation
- ECE 569 Advanced Random Processes
- ECE 642 Optimal Control

PhD Candidacy Exam

ECE PhD Milestones at a Glance





30 course credits, 30 dissertation credits

Before the Preliminary Exam (PE)

- Form a dissertation committee
  - ➡ 3 ECE faculty chosen before preliminary exam
  - ➡ 1 external adviser chosen before dissertation proposal defense
- Plan of study
  - ➡ approved by dissertation committee
- Courses
  - ➡ at least 12 ECE graduate credits hours at UD
- Graduate forms: https://udayton.edu/engineering/about/office-of-the-dean/student-resources/grad_resources.php
- PE form: https://www.udayton.edu/engineering/departments/electrical_and_computer/grad_electrical/student_resources.php

Preliminary Exam (PE)

- Purpose
  - ➡ determine baseline background
- PE format
  - ➡ written exam, 5 hour period
  - ➡ questions drawn from 4 preliminary exam classes (PEC)
  - ➡ GPC assigns appropriate faculty to prepare questions
- Logistics
  - ➡ requirements:
    - ★ at least 12 credits of graduate coursework at UD
    - ★ at least 12 credits of PECs
  - ➡ only once per semester
  - ➡ 2 chances to pass the PE => dismissed if 2nd attempt failed
- May be waived if overall GPA ≥ 3.5 in at least 4 PECs

Preliminary Exam Application Form

UNIVERSITY OF DAYTON
ELECTRICAL AND COMPUTER ENGINEERING
PRELIMINARY EXAM APPLICATION

TO: The Chair of ECE Graduate Program Committee

The Preliminary Examination (PE) is a diagnostic test to assess the background of the student based on questions drawn from four Preliminary Exam Courses (PEC). Before the PE is taken, students must have earned at least twelve ECE graduate credit hours beyond the MS degree and completed at least four PECs. The PE is a requirement for every student who does not apply for a waiver (see below).

_____ _____
Student's Name Date

List 1: List twelve ECE credits of graduate courses the student completed at UD.

Class	Institution	Date	Grade
	University of Dayton		
	University of Dayton		
	University of Dayton		
	University of Dayton		

List 2: List four PECs (or equivalent courses at another university) that the student completed. The approved PECs are: ECE 501, 503, 506, 507, 509, 521, 531, 533, 536, 547, 561, 572, and 581. They may include classes taken during MS, and they may overlap with **List 1.**

Class	Institution	Date	Grade

Preliminary Exam: Student applies to take the Preliminary Exam in the ☐Fall ☐Winter semester. Questions for PE will be drawn from **List 2**.

Waiver: *The student may apply for PE requirement waiver if the combined GPA of four PECs taken at the University of Dayton is greater than or equal to 3.5.*

Students who have taken one or more PECs at another institution may also apply for a PE waiver. The waiver will be granted if the student has a UD GPA (List 1) greater or equal to 3.5, and the combined GPA of four PECs (taken at UD or elsewhere) is 3.5 or above.

☐ *Student applies for PE requirement waiver. GPA of* ***List 1*** *is _____. GPA of* ***List 2*** *is _____. (Attach appropriate documentation, such as class syllabi for classes not taken at UD.)*

_____ _____
Chairperson, Dissertation Advisory Committee Date

For official use only.	Preliminary Exam is
_____ _____ Chairperson, Graduate Program Committee Date	☐ Passed ☐ Failed ☐ Waived

Released 2-Oct-12.

Qualifying Exam (QE)

- First part of the Candidacy Exam
- Purpose
  - ➡ assess ability to carry out independent, unsupervised research leading to a well thought written report
- QE format
  - ➡ a written and oral exam
  - ➡ a research question formulated by the candidacy committee
  - ➡ written: the student is given approximately a month to work on the problem and submit a written report
  - ➡ oral: a brief presentation on the research problem
  - ➡ outcomes: (requires unanimous vote) pass, conditional pass, fail
    - ★ conditional pass: committee recommends actions student must fulfill
- Logistics
  - ➡ requirements: no more than 12 dissertation credits before completing QE
  - ➡ 2 chances to pass the QE => dismissed if 2nd attempt failed

Dissertation Proposal Defense (DPD)

- Second part of the Candidacy Exam
- Purpose
  - ➡ assess qualification for a meaningful and publishable dissertation
  - ➡ defend a research idea before a critical audience
- DPD format
  - ➡ a written and oral defense
  - ➡ written: a written proposal
  - ➡ oral: presentation of preliminary doctoral level research work
  - ➡ outcomes: (requires unanimous vote) accept, conditional accept, reject
    - ★ conditional accept: committee recommends actions student must fulfill
- Logistics
  - ➡ requirements:
    - ★ all courses completed
    - ★ at least 6 dissertation credits before DPD
    - ★ at least 12 dissertation credits before DD

Dissertation Defense (DD)

- Purpose
  - ➡ assess the quality of research work and dissertation
  - ➡ defend a research idea before a critical audience
- DD format
  - ➡ a written and oral defense
  - ➡ written: a written dissertation
  - ➡ oral: presentation of doctoral research work
  - ➡ outcomes: (requires unanimous vote) accept, conditional accept, reject
    - ★ conditional accept: committee recommends actions student must fulfill
- Logistics
  - ➡ requirements:
    - ★ at least one journal submission (*above and beyond any submissions from ECE697, ECE698*)
    - ★ all dissertation credits are taken

Again, Important Forms Are Found Here:

- Graduate forms: https://udayton.edu/engineering/about/office-of-the-dean/student-resources/grad_resources.php
- PE form: https://www.udayton.edu/engineering/departments/electrical_and_computer/grad_electrical/student_resources.php
- You can also find all the forms under the **Porches Engineering page**:
  - ★ Under Policies, Processes and Forms on the page, you'll find a link to the Plan of Study and other graduate forms

Plan of Study: MS and PhD

University of Dayton School of Engineering

GRADUATE PROGRAM OF STUDY

This document is required after nine hours of graduate courses have been completed. Please complete the form on-line and then print for signatures. Handwritten documents will be returned.

Student Name: _____ Student ID No. _____

Master's of Science in: _____ ☐ Thesis ☐ Non-Thesis

Course Code & Number	Course Name	Term taken if BPM Student	Semester Credit Hours
		Total Credit Hours:	

Prerequisites:

Thesis Area:

Subject:

Remarks:

_____ _____
Student Signature Date

_____ _____
Advisor Date

_____ _____
Graduate Program Director or Department Chair Date

_____ _____
Robert J. Wilkens, Ph.D., Associate Dean, Professor Date

9/26/18 Original – Enrollment Services; Copies: Student, Academic Dept. & Graduate Engineering

University of Dayton School of Engineering

DOCTORAL PROGRAM OF STUDY

The student is required to complete the Program of Study before the beginning of the third semester of the student's enrollment. It is to be initially approved by the advisory committee chairperson, department chair or program director, and the associate dean of engineering. Once the doctoral advisory committee has been formed, the committee members must also approve the Program of Study.

Please complete the form on-line and then print for signatures. Handwritten documents will be returned.

Student Name: _____ Student ID No. _____

Major Field of Study: _____ ☐ Ph.D. Candidate ☐ D.E. Candidate

Candidate has obtained a Master's Degree: ☐ Yes ☐ No

Required Courses/Dissertation (a total of 60 hours with a MS Degree; 90 hours without a MS degree)

Course Code & Number	Course Name	University & Date of Enrollment	Transfer Course	Satisfies Math Req.	Semester Credit Hours
				Total Credit Hours:	

_____ _____ _____ _____
Student Signature Date Chairperson, Advisory Committee Date

_____ _____ _____ _____
Dept. Chair/Program Director Date Robert J. Wilkens, Ph.D., Associate Dean, Professor Date

Committee Approval of Program of Study: Obtain the below signatures once the doctoral committee has been formed.

_____ _____ _____ _____
Chairperson, Advisory Committee Date Committee Member Date

_____ _____ _____ _____
Committee Member Date Committee Member Date

_____ _____ _____ _____
Committee Member Date Committee Member Date

_____ _____ _____ _____
Dept. Chair/Program Director Robert J. Wilkens, Ph.D., Associate Dean, Professor Date

9/26/18 Original – Enrollment Services; Copies: Student, Academic Dept. & Graduate Engineering

Other Important Forms: Doctoral Advisory Comm.

Other Important Forms: Candidacy Exam Report

UNIVERSITY OF DAYTON
SCHOOL OF ENGINEERING
CANDIDACY EXAMINATION REPORT

TO: Advisory Committee

The student must pass all parts of the examination to be admitted to candidacy. The student is considered to have passed only when the decision of the doctoral advisory committee is unanimous. All members must sign the examination report form with an indication of their decision noted prior to its being submitted to the Assistant Dean of Graduate Engineering Programs and Research. If any part of the examination is unsatisfactory, the student will be notified in writing of the conditions for another examination. *(Excerpted from the current graduate bulletin).*

_____ _____ _____
Student's Name Major Field of Study Date

PART 1 ☐ (Written and Oral Examination)

PART 2 ☐ (Oral Exam on the Dissertation Proposal)

Indication of decision is by signature and encircling Pass or Fail:

Chairperson, Advisory Committee	Pass	Fail	Committee Member	Pass	Fail
Committee Member	Pass	Fail	Committee Member	Pass	Fail
Committee Member	Pass	Fail	Committee Member	Pass	Fail

Unless the committee decision is unanimous for pass, the student is to be notified by the Assistant Dean of the following conditions for another exam:

_____

_____

_____

This form is to be independently completed for Part 1 and Part 2 of the candidacy exam except in cases where the individual parts are administered on the same day and the decision is the same for both parts.

After both parts of the candidacy exam have been successfully passed, the Assistant Dean will notify the student of his or her admission to candidacy.

Report received: _____ Date: _____
Associate Dean, Graduate Studies, Engineering

Revised 2.16.11

Other Important Forms: DD Request

University of Dayton School of Engineering

REQUEST TO SCHEDULE
DISSERTATION DEFENSE

Please complete the form on-line and then print for signatures. Handwritten documents will be returned.

Student Name: _____ Student ID No. _____

TO: Associate Dean, Graduate Studies

I hereby request that your office schedule my Dissertation Defense as follows:

DATE:

TIME:

PLACE:

DISSERTATION TITLE:

ABSTRACT: *Please attach copy to the request form*

My advisory committee members concur in this request and so indicate by their signatures below:

_____ Chairperson, Advisory Committee	Date	_____ Committee Member	Date
_____ Committee Member	Date	_____ Committee Member	Date
_____ Committee Member	Date	_____ Committee Member	Date

APPROVAL: _____
Robert J. Wilkens, Associate Dean for Research & Innovation, Professor Date

9/26/18 Original – Graduate Engineering Copies: Student, Academic Department